

PROCEEDINGS

OF THE AMERICAN SOCIETY OF CIVIL ENGINEERS

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NEW YORK 1914

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American Society of Civil Engineers

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ON VALUATION OF PUBLIC UTILITIES: Frederic P. Stearns, Charles S. Churchill, Leonard Metcalf, William G. Raymond, Jonathan P. Snow, William J. Wilgus.

TO INVESTIGATE CONDITIONS OF EMPLOYMENT OF, AND COMPENSATION OF, CIVIL ENGINEERS: Nelson P. Lewis, S. L. F. Deyo, Dugald C. Jackson, William V. Judson, George W. Tillson, C. F. Loweth, John A. Bensel.

TO CODIFY PRESENT PRACTICE ON THE BEARING VALUE OF SOILS FOR FOUNDATIONS, ETC.: Robert A. Cummings, Edward C. Shankland, Edwin Duryea, Jr., James C. Meem, Walter J. Douglas, Samuel T. Wagner, Frank M. Kerr.

ON A NATIONAL WATER LAW: F. H. Newell, George G. Anderson, Charles W. Comstock, Clemens Herschel, W. C. Head, Robert E. Horton, John H. Lewis, Charles D. Marx, Gardner S. Williams.

ON FLOODS AND FLOOD PREVENTION: C. McD. Townsend, John A. Bensel, T. G. Dabney, C. E. Grunsky, Frank M. Kerr, Morris Knowles, J. B. Lippincott, Daniel W. Mead, John A. Ockerson, Arthur T. Safford, Charles Saville, F. L. Sellew.

TO REPORT ON STRESSES IN RAILROAD TRACK: A. N. Talbot, A. S. Baldwin, J. B. Berry, G. H. Bremner, John Brunner, W. J. Burton, Charles S. Churchill, W. C. Cushing, Robert W. Hunt, George W. Kittredge, C. G. E. Larsson, William McNab, G. J. Ray, F. E. Turneaure, J. E. Willoughby.

The House of the Society is open from 9 A. M. to 10 P. M. every day, except Sundays, Fourth of July, Thanksgiving Day, and Christmas Day.

HOUSE OF THE SOCIETY—220 WEST FIFTY-SEVENTH STREET, NEW YORK.

TELEPHONE NUMBER..... 5913 Columbus
CABLE ADDRESS..... "Ceas, New York."

*Elected to fill the vacancy caused by the death of Emil Gerber, Director, on April 16th, 1914.

AMERICAN SOCIETY OF CIVIL ENGINEERS
INSTITUTED 1852

PROCEEDINGS

This Society is not responsible for any statement made or opinion expressed in its publications.

SOCIETY AFFAIRS

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MINUTES OF MEETINGS

OF THE SOCIETY

April 15th, 1914.—The meeting was called to order at 8.30 p. m.; Vice-President J. Waldo Smith in the chair; Charles Warren Hunt, Secretary; and present, also, 162 members and 23 guests.

A paper by J. A. L. Waddell, M. Am. Soc. C. E., entitled, "The Possibilities in Bridge Construction by the Use of High-Alloy Steels", was presented by the author, who illustrated his remarks with lantern slides. The paper was discussed by Messrs. N. Petinot, L. Moisseiff, Henry W. Hodge, F. W. Skinner, and the author. The Secretary reported that he had received communications on the subject from Messrs. M. J. Butler, Albert Lucius, and Charles Evan Fowler. These were not presented on account of lack of time.

H. de B. Parsons, M. Am. Soc. C. E., gave an illustrated description of the Plans for Main Drainage and Sewage Disposal for the City of New York.

The Secretary announced the following deaths:

JAMES LEWIS FRAZIER, of Louisville, Ky., elected Member, September 1st, 1880; died February 28th, 1914.

GEORGE ALFRED NELSON, of Lowell, Mass., elected Member, April 4th, 1911; died June 3d, 1913.

DUNCAN HUGH CAMPBELL, of Rio de Janeiro, Brazil, elected Associate Member, July 1st, 1909; died March 29th, 1914.

PHILIP CHAPIN DAVIS, of New York City, elected Associate Member, June 4th, 1913; died March 26th, 1914.

WILLIAM CHURCHILL OASTLER, of New York City, elected Associate, March 31st, 1891; died March 31st, 1914.

Adjourned.

May 6th, 1914.—The meeting was called to order at 8.30 p. m.; President Hunter McDonald in the chair; Charles Warren Hunt, Secretary; and present, also, 144 members and 23 guests.

The minutes of the meetings of March 18th, and of April 1st and 2d, 1914, were approved as printed in *Proceedings* for April, 1914.

A paper by Guy B. Waite, M. Am. Soc. C. E., entitled "Cinder Concrete Floors", was presented by the author, and the subject was discussed by Messrs. W. B. Claflin, R. Montfort, C. F. Loweth, Charles C. Hurlbut, Oscar Lowinson, A. W. Buel, F. W. Skinner, and the author. The Secretary read discussions by Messrs. Arthur H. Diamant and J. R. Worcester.

A paper by Charles H. Lee, Assoc. M. Am. Soc. C. E., entitled "The Determination of Safe Yield of Underground Reservoirs of the Closed-Basin Type", was presented by the Secretary, and the subject was discussed by Messrs. James Owen and T. Kennard Thomson.

The Secretary announced the election of the following candidates on May 6th, 1914:

As MEMBERS

GEORGE WASHINGTON BIGGS, JR., Pittsburgh, Pa.

GEORGE EDWARD CAMPBELL, Los Angeles, Cal.

HARRY VIVIAN FRANCIS, Darwin, Northern Territory, Australia

FRED FORCE GORDON, Rochester, N. Y.

JAMES ORMEROD HEYWORTH, Chicago, Ill.

GEORGE FORREST MAITLAND, Cheyenne, Wyo.

ROBERT ANDERSON MEEKER, Plainfield, N. J.

JULIUS KEMBLE MOÑROE, Bruceton Mills, W. Va.

FRANK RHEA, Washington, D. C.

WILLIAM LITTLE SEDDON, Norfolk, Va.

HENRY THOMAS SHELLEY, Philadelphia, Pa.

FREDERIC IRVING WINSLOW, Boston, Mass.

EBERHARD JOHN WULFF, Tarrytown, N. Y.

AS ASSOCIATE MEMBERS

JOHN FLINN ANCONA, Rochester, N. Y.
HORACE FRANCIS ANTHONY, Camanche, Iowa
EDWARD ADAM BECK, Sewickley, Pa.
CHARLES GREENWOOD BENSON, Washington, D. C.
LUCIUS TULLIUS BERTHE, Charleston, Mo.
JAMES GIBBONS BROWNE, Navasota, Tex.
HOWARD BLAINE BUSHNELL, Springfield, Ill.
ASA CLAIR BUTTERWORTH, Little Rock, Ark.
JOHN ROSS CHAMBERLIN, Columbus, Ohio
WILLIAM GIDEON CLOSSON, Brooklyn, N. Y.
GAYLORD CHURCH CUMMIN, Dayton, Ohio
MAX LEE CUNNINGHAM, Oklahoma City, Okla.
EDWARD MYRON ELLIS, Minetto, N. Y.
ALBERT THEODORE GOLDBECK, Philadelphia, Pa.
GILBERT G HALL, South Bend, Wash.
HIPOLIT MIKOLAJ HINCI, Chicago, Ill.
WINFRED MILLER KALLASCH, Tiltonville, Ohio
FREDERICK LIDDELL MACPHERSON, Edmonds, B. C., Canada
WILLIAM RAY McCANN, Culebra, Canal Zone, Panama
FLOYD FRANCIS McDOWELL, Yonkers, N. Y.
LEON WADDELL MASHBURN, Tunica, Miss.
PAUL BERTOLET MILLER, Houston, Tex.
ARTHUR ROLAND MOORE, Kelowna, B. C., Canada
JOSEPH LINCOLN MURPHY, Nelsonville, Ohio
THOMAS HARTMAN OLDS, Sorocaba, Brazil
CHARLES WESLEY PETIT, Oxnard, Cal.
BION HARMAN PIEPMEIER, Springfield, Ill.
FREDERICK HENRY POND, Brooklyn, N. Y.
ARTHUR RUDOLPH RHENISCH, Oak Park, Ill.
JAMES RUSH RHYNE, Corning, Ark.
HERMAN SCHOVE SCHICK, Manila, Philippine Islands
NIAL SHERWOOD, Preston, Idaho
FREDERICK PARDON SISSON, Detroit, Mich.
WILLIAM WOOD SMITH, Montreal, Que., Canada
CHARLES HENRY STEVENS, Philadelphia, Pa.
FRANKLIN STEVENS STOREY, New York City
RALPH WATTS WARDWELL, Colorado Springs, Colo.
ERNST VICTOR WILLARD, St. Paul, Minn.
GUY ERIC WOODWARD, Seattle, Wash.

AS ASSOCIATE

NATHAN ABBOTT BOWERS, Vancouver, B. C., Canada

As JUNIORS

ELMER STYNER BLAINE, Cape Girardeau, Mo.
 EMANUEL LEO BOLANO, Albany, N. Y.
 EDWIN GIBSON BOLGER, Altoona, Pa.
 HARRY WILLIAM BOLIN, Berkeley, Cal.
 ROBERT HAMMOND BOYNTON, Frankfort, Ind.
 PAUL CALDWELL CAMPBELL, Kansas City, Mo.
 SINCLAIR ERNEST CARPENTER, Berkeley, Cal.
 LORENZO TODD GETTY, Newcastle, Ont., Canada
 CLAUDE FRANKLIN HANCOCK, Chassell, Mich.
 PHILIP ZELL HORTON, Peoria, Ill.
 CHARLES CHRISTOPHER KILBY, New Haven, Conn.
 LIVINGSTON ALLAIRE LEEDS, New York City
 DONALD CURTIS MAY, Ann Arbor, Mich.
 ARTHUR HERBERT MORRISON, Portland, Me.
 CLIFFORD EATON MURRAY, Newark, N. J.
 QUINCES ROBERTUS NOLAN, Atlanta, Ga.
 ADOLPH JOSEPH POST, Boston, Mass.
 WALTER WESLEY SCHUYLER, Bocas del Toro, Panama
 LYSLE ENOCH SPANGLER, Berkeley, Cal.
 WALTER STEINBRUCH, Brooklyn, N. Y.
 MARION JACKSON VERDERY, JR., Great Falls, Mont.
 ROBERT YULE WALKER, Belton, Tex.

The Secretary announced the transfer of the following candidates on May 6th, 1914:

FROM ASSOCIATE MEMBER TO MEMBER

CALVIN LEWIS BARTON, New York City
 MCCREA PARKER BLAIR, St. Boniface, Man., Canada
 ELWYN LORENZO CLARKE, Sheridan, Wyo.
 HARRY WHITING DENNIS, Los Angeles, Cal.
 CHARLES JOHN ELD, JR., Little Rock, Ark.
 CHARLES RICE GOW, West Roxbury, Mass.
 NATHAN CLIFFORD GROVER, Washington, D. C.
 CLYDE LESLIE HUFF, Athabasca, Alberta, Canada
 OLAF LAURGAARD, Laidlaw, Ore.
 BOUDINOT GAGE LEAKE, Fort Worth, Tex.
 MORTON MACARTNEY, Spokane, Wash.
 STACY STEWARD STORER, Oklahoma City, Okla.
 WILKIE WOODARD, Los Angeles, Cal.

FROM JUNIOR TO ASSOCIATE MEMBER

WALTER BENJAMIN BUSHWAY, Boston, Mass.
 J C CARPENTER, St. Paul, Minn.

GUSTAVO ADOLFO DUBOIS, Havana, Cuba
CHESTER GORDON GILLESPIE, Chicago, Ill.
ALVERO CHARLES GREGSON, Flushing, N. Y.
ARTHUR RAYMOND HOLBROOK, Brooklyn, N. Y.
JOHN CHARLES RATHBUN, Manila, Philippine Islands
WALTER FARNSBY SHAW, Barneveld, N. Y.
VINCENT REYNOLDS STIRLING, Zamboanga, Philippine Islands
JOHN LEONARD VOGEL, Jersey City, N. J.

The Secretary announced the following deaths:

HOWARD ELMER ARTHUR, of Big Hollow, N. Y., elected Member November 8th, 1909; died April 19th, 1914.

EMIL GERBER (*Director*), of Pittsburgh, Pa., elected Member, February 1st, 1888; died April 16th, 1914.

THOMAS H. JOHNSON, of Pittsburgh, Pa., elected Member, September 5th, 1877; died April 16th, 1914.

ALFRED NOBLE (*Past-President*), of New York City, elected Junior, September 2d, 1874; Member, April 3d, 1878; died April 19th, 1914.

FRED THOMPSON, of Washington, D. C., elected Member, October 1st, 1902; died April 22d, 1914.

JOSEPH TINTORER Y GIBERGA, of Barcelona, Spain, elected Member, May 5th, 1880; died January 8th, 1914.

LAWRENCE CALVIN BRINK, of New York City, elected Associate Member, October 7th, 1908; died May 2d, 1914.

AARON J. ZABRISKIE, of Jersey City, N. J., elected Junior, July 1st, 1885; died April 15th, 1914.

Adjourned.

OF THE BOARD OF DIRECTION

(Abstract)

May 6th, 1914.—The Board met at 3.15 p. m.; President McDonald in the chair; Chas. Warren Hunt, Secretary; and present, also, Messrs. Bush, Edwards, Haskell, Hodge, Keefer, Leonard, Loweth, Montfort, Ockerson, Smith, Swain, Thomson, and Tuttle.

The following resolutions were adopted:

"Resolved: That \$10 000 be allotted by the Board as the maximum sum available for the work of Special Committees during 1914, excluding unexpended balances left over from appropriations made previous to the present year."

"Resolved: That a Sub-Committee of the Board be appointed to consider the reports of Chairmen of Special Committees and to recommend to the Board such action as they consider desirable regarding the scope of the investigations proposed by and the expenditures of such Special Committees."

The President appointed as such Committee Messrs. Swain, Edwards, and Hodge.

The Secretary reported that \$20 000 had been paid on the mortgage debt of the Society, which reduces the debt to \$60 000.

The Constitution of the Louisiana Association of Members of the American Society of Civil Engineers was approved. The headquarters of this Association is in New Orleans.

Ballots for membership were canvassed, resulting in the election of 13 Members, 39 Associate Members, 1 Associate, 22 Juniors, and the transfer of 10 Juniors to the grade of Associate Member.

Thirteen Associate Members were transferred to the grade of Member.

Applications were considered and other routine business transacted.

Adjourned.

ANNOUNCEMENTS

The House of the Society is open from 9 A. M. to 10 P. M., every day, except Sundays, Fourth of July, Thanksgiving Day, and Christmas Day.

FUTURE MEETINGS

September 2d, 1914.—8.30 P. M.—A regular business meeting will be held, and two papers will be presented for discussion, as follows: "Some Principles Relating to the Administration of Streams", by Clarence T. Johnston, Assoc. M. Am. Soc. C. E.; and "The Construction of the Klondike Pipe Line", by W. W. Edwards, Assoc. M. Am. Soc. C. E.

These papers are printed in this number of *Proceedings*.

September 16th, 1914.—8.30 P. M.—At this meeting two papers will be presented for discussion, as follows: "The Constant-Angle Arch Dam", by Lars R. Jorgensen, Assoc. M. Am. Soc. C. E.; and "Subaqueous Highway Tunnels", by George Duncan Snyder, M. Am. Soc. C. E.

These papers are printed in this number of *Proceedings*.

ANNUAL CONVENTION

The Forty-sixth Annual Convention of the Society will be held at Baltimore, Md., from June 2d to 5th, 1914, inclusive.

A circular giving full information in reference to the Convention was issued on April 24th, 1914.

SEARCHES IN THE LIBRARY

In January, 1902, the Secretary was authorized to make searches in the Library, upon request, and to charge therefor the actual cost to the Society for the extra work required. Since that time many searches have been made, and bibliographies and other information on special subjects furnished.

The resulting satisfaction, to the members who have made use of the resources of the Society in this manner, has been expressed frequently, and leaves little doubt that if it were generally known to the membership that such work would be undertaken, many would avail themselves of it.

The cost is trifling compared with the value of the time of an engineer who looks up such matters himself, and the work can be performed quite as well, and much more quickly, by persons familiar with the Library.

In asking that such work be undertaken, members should specify clearly the subject to be covered, and whether references to general

books only are desired, or whether a complete bibliography, involving search through periodical literature, is desired.

In reference to this work the Appendices* to the Annual Reports of the Board of Directors for the years ending December 31st, 1906, and December 31st, 1910, contain summaries of all searches made to date.

PAPERS AND DISCUSSIONS

Members and others who take part in the oral discussions of the papers presented are urged to revise their remarks promptly. Written communications from those who cannot attend the meetings should be sent in at the earliest possible date after the issue of a paper in *Proceedings*.

All papers accepted by the Publication Committee are classified by the Committee with respect to their availability for discussion at meetings.

Papers which, from their general nature, appear to be of a character suitable for oral discussion, will be published as heretofore in *Proceedings*, and set down for presentation to a future meeting of the Society, and on these, oral discussions, as well as written communications, will be solicited.

All papers which do not come under this heading, that is to say, those which from their mathematical or technical nature, in the opinion of the Committee are not adapted to oral discussion, will not be scheduled for presentation to any meeting. Such papers will be published in *Proceedings* in the same manner as those which are to be presented at meetings, but written discussions only will be requested for subsequent publication in *Proceedings* and with the paper in the volumes of *Transactions*.

The Board of Direction has adopted rules for the preparation and presentation of papers, which will be found on page 429 of the August, 1913, *Proceedings*.

LOCAL ASSOCIATIONS OF MEMBERS OF THE AMERICAN SOCIETY OF CIVIL ENGINEERS

San Francisco Association

The San Francisco Association of Members of the American Society of Civil Engineers holds regular bi-monthly meetings, with banquet, and weekly informal luncheons. The former are held at 6 P. M., at the Palace Hotel, on the third Friday of February, April, June, August, October, and December, the last being the Annual Meeting of the Association.

Informal luncheons are held at 12.15 P. M. every Wednesday, and the place of meeting may be ascertained by communicating with the

* *Proceedings*, Vol. XXXIII, p. 20 (January, 1907); Vol. XXXVII, p. 28 (January, 1911).

Secretary of the Association, E. T. Thurston, Jr., M. Am. Soc. C. E., 713 Mechanics' Institute, 57 Post Street.

The by-laws of the Association provide for the extension of hospitality to any member of the Society who may be temporarily in San Francisco, and any such member will be gladly welcomed as a guest.

(Abstract of Minutes of Meeting)

February 20th, 1914.—The meeting was called to order at the Palace Hotel; President Snyder in the chair; E. T. Thurston, Jr., Secretary; and present, also, 80 members and guests.

President Snyder, in a brief inaugural address, reviewed the progress of the Association since its organization and the improved status of the engineer during the same period. He also submitted the following classification of the Members and Associate Members according to their specialties in 1907 and 1913, respectively:

	1907.	1913.
General construction.....	24%	26%
Building construction.....	15%	25%
Hydraulic.....	17%	18%
U. S. Government.....	8%	7%
Mining.....	13%	5%
Railway and traction.....	13%	9%
Municipal.....	10%	10%

The proposed Amendments to the Constitution of the American Society of Civil Engineers were discussed.

J. D. Galloway, M. Am. Soc. C. E., presented a paper on "Some Observations of an Engineer in Europe", which included an interesting account of many engineering features in Europe, particularly with reference to waterways, roads, and bridges, illustrating his remarks with stereopticon views.

Adjourned.

Colorado Association

The meeting of the Colorado Association of Members of the American Society of Civil Engineers are held on the second Saturday of each month, except July and August. The hour and place of meeting are not fixed, but this information will be furnished on application to the Secretary, Roger W. Toll, Assoc. M. Am. Soc. C. E., 700 Tramway Building, Denver, Colo. The meetings are usually preceded by an informal dinner. Members of the American Society of Civil Engineers will be welcomed at these meetings.

Weekly luncheons are held on Wednesdays, at 12.30 P. M., at the Colorado Electric Club.

Visiting members are urged to attend the meetings and luncheons.

(Abstract of Minutes of Meeting)

April 11th, 1914.—The meeting was called to order at the Albany Hotel; President Ridgway in the chair; Roger W. Toll, Secretary; and present, also, 38 members and guests.

The minutes of the meeting of March 14th, 1914, were read and approved.

An invitation from the University of Colorado to hold the next meeting of the Association at the University, at Boulder, was presented and accepted unanimously, and the date of the meeting was set for May 16th, 1914.

F. H. Newell, M. Am. Soc. C. E., presented a paper on "The Work of the Reclamation Service", illustrating his remarks with stereopticon views. The subject was discussed by Messrs. A. P. Davis, J. C. Nagle, P. M. Norboe, W. D. Beers, A. J. Parshall, W. M. Reed, and others.

A vote of thanks was tendered Mr. Newell for his interesting paper.
Adjourned.

Atlanta Association

The Atlanta Association of Members of the American Society of Civil Engineers was organized on March 14th, 1912. The Association holds its meetings at the University Club.

At the meeting of the Association on December 29th, 1913, the new Chairman, John Ruddle, M. Am. Soc. C. E., was installed, and Messrs. Park A. Dallis and G. R. Solomon were appointed members of the Executive Committee. T. P. Branch, Assoc. M. Am. Soc. C. E., was elected Secretary.

Louisiana Association

At its meeting of May 6th, 1914, the Board of Direction considered and approved the proposed Constitution of the Louisiana Association of Members of the American Society of Civil Engineers.

Philadelphia Association

On December 22d, 1913, the Philadelphia Association of Members of the American Society of Civil Engineers was organized with the following officers: George S. Webster, President; Richard L. Humphrey and F. Herbert Snow, Vice-Presidents; John Sterling Deans, J. W. Ledoux, Edgar Marburg, and H. S. Smith, Directors; S. M. Swaab, Treasurer; and W. L. Stevenson, Secretary. The meetings of the Association will be held at the Engineers' Club of Philadelphia, 1317 Spruce Street.

(Abstract of Minutes of Meeting)

April 6th, 1914.—The meeting was called to order at the Engineers' Club; President George S. Webster in the chair; W. L. Stevenson, Secretary; and present, also, 75 members and guests.

The by-laws which had been prepared by the Board of Direction, were submitted and approved.

Frederic F. Stearns, Past-President, Am. Soc. C. E., delivered an address on the "Valuation of Public Utilities," and the subject was discussed by Messrs. J. A. Emery, F. Herbert Snow, Thomas W. Hulme, E. D. Temple, E. Marburg, and John Sterling Deans.

Adjourned.

Portland, Ore., Association

On June 18th, 1913, the Portland, Ore., Association of Members of the American Society of Civil Engineers was organized with the following officers: E. G. Hopson, President; W. S. Turner, First Vice-

President; D. D. Clarke, Second Vice-President; G. B. Hegardt, Treasurer; and Charles J. McGonigle, Secretary.

(Abstract of Minutes of Meeting)

April 4th, 1914.—The meeting was called to order at the Commercial Club; President E. G. Hopson in the chair; Charles J. McGonigle, Secretary; and present, also, 11 members.

The minutes of the preceding meeting were read and approved.

A communication from Hunter McDonald, President, Am. Soc. C. E., asking for an expression of opinion on the advisability of the Association affiliating with local engineers who were not members of the Society, was read and discussed. On motion by Mr. Clarke, duly seconded, the following Resolution was adopted:

"That it is the sense of this meeting that the present organization answers the requirements of the American Society of Civil Engineers."

On motion, duly seconded, the Secretary was instructed to write to Mr. McDonald stating that the above Resolution had been adopted.

The Chairman or Secretary was ordered to communicate with prospective speakers and request them to prepare abstracts of their papers for publication, said abstracts, however, to be optional with the speakers.

The present policy of meeting once a month, as has been done since the formal organization of the Association, was approved by the meeting.

J. P. Newell, M. Am. Soc. C. E., presented a paper entitled "Depreciation as Applied in the Valuation of Public Utilities," and, on motion by Messrs. Clarke and Stubblefield, a copy of the paper was ordered to be forwarded to the Secretary of the Society for publication as part of the discussion on the Report of the Special Committee on the Valuation of Public Utilities. Mr. Newell was tendered a vote of thanks by the Association.

Adjourned.

Seattle Association

At the Annual Meeting of the Association, held on January 26th, 1914, the following officers were elected for the ensuing year: Ernest B. Hussey, President; A. H. Fuller, Vice-President; and Carl H. Reeves, Secretary-Treasurer.

Southern California Association

The Southern California Association of Members of the American Society of Civil Engineers holds regular bi-monthly meetings, with banquet, on the second Wednesday of February, April, June, August, October, and December, the last being the Annual Meeting of the Association.

Informal luncheons are held at 12.15 P. M. every Wednesday, and the place of meeting may be ascertained from the Secretary of the Association, W. K. Barnard, M. Am. Soc. C. E., 514 Central Building, Los Angeles, Cal.

The by-laws of the Association provide for the extension of hospitality to any member of the Society who may be temporarily in

Los Angeles, and any such member will be gladly welcomed as a guest at any of the meetings or luncheons.

(Abstract of Minutes of Meeting)

April 8th, 1914.—The meeting was called to order; Vice-President Leeds in the chair; and W. K. Barnard, Secretary.

A paper by Dr. Ford A. Carpenter, in charge of the U. S. Weather Bureau Office at Los Angeles, entitled "The Excessive Rainfall of February, 1914," was presented by the author and generally discussed.

In view of the fact that there was an apparent paucity of funds for the maintenance of a sufficient number of observation stations in the vicinity of Los Angeles, a motion was presented and carried that a committee be appointed to investigate and, if possible, secure a fund for the purchase of additional observation instruments to be used under the supervision of the Weather Bureau Office, subject to the approval of the Chief of the Weather Bureau.

A motion was made and carried that the Board of Directors appoint a Committee to investigate the matter of representation of the American Society of Civil Engineers on the Building Commission of Los Angeles.

Adjourned.

Spokane Association

At its meeting of March 4th, 1914, the Board of Direction considered and approved the proposed Constitution of the Spokane Association of Members of the American Society of Civil Engineers.

The following officers have been elected: President, C. S. MacCalla; Vice-President, U. B. Hough; Second Vice-President, Morton Macartney; Secretary-Treasurer, A. D. Butler.

Texas Association

At its meeting of December 31st, 1913, the Board of Direction considered and approved the proposed Constitution of the Texas Association of Members of the American Society of Civil Engineers.

**PRIVILEGES OF ENGINEERING SOCIETIES
EXTENDED TO MEMBERS OF THE
AMERICAN SOCIETY OF CIVIL ENGINEERS**

Members of the American Society of Civil Engineers will be welcomed by the following Engineering Societies, both to the use of their Reading Rooms, and at all meetings:

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American Society of Mechanical Engineers, 29 West Thirty-ninth Street, New York City.

Architekten-Verein zu Berlin, Wilhelmstrasse 92, Berlin W. 66, Germany.

Associação dos Engenheiros Civis Portuguezes, Lisbon, Portugal.

Australasian Institute of Mining Engineers, Melbourne, Victoria, Australia.

Boston Society of Civil Engineers, 715 Tremont Temple, Boston, Mass.

Brooklyn Engineers' Club, 117 Remsen Street, Brooklyn, N. Y.

Canadian Society of Civil Engineers, 413 Dorchester Street, West, Montreal, Que., Canada.

Civil Engineers' Society of St. Paul, St. Paul, Minn.

Cleveland Engineering Society, Chamber of Commerce Building, Cleveland, Ohio.

Cleveland Institute of Engineers, Middlesbrough, England.

Dansk Ingeniorforening, Amaliegade 38, Copenhagen, Denmark.

Engineers and Architects Club of Louisville, 1412 Starks Building, Louisville, Ky.

Engineers' Club of Baltimore, Baltimore, Md.

Engineers' Club of Minneapolis, 17 South Sixth Street, Minneapolis, Minn.

Engineers' Club of Philadelphia, 1317 Spruce Street, Philadelphia, Pa.

Engineers' Club of St. Louis, 3817 Olive Street, St. Louis, Mo.

Engineers' Club of Toronto, 96 King Street, West, Toronto, Ont., Canada.

Engineers' Society of Northeastern Pennsylvania, 415 Washington Avenue, Scranton, Pa.

Engineers' Society of Pennsylvania, 31 South Front Street, Harrisburg, Pa.

Engineers' Society of Western Pennsylvania, 2511 Oliver Building, Pittsburgh, Pa.

Institute of Marine Engineers, 58 Romford Road, Stratford, London, E., England.

Institution of Engineers of the River Plate, Calle 25 de Mayo 195, Buenos Aires, Argentine Republic.

Institution of Naval Architects, 5 Adelphi Terrace, London, W. C., England.

Junior Institution of Engineers, 39 Victoria Street, Westminster, S. W., London, England.

Koninklijk Instituut van Ingenieurs, The Hague, The Netherlands.

Louisiana Engineering Society, Room 6, City Bank and Trust Company Building, New Orleans, La.

Memphis Engineering Society, Memphis, Tenn.

Midland Institute of Mining, Civil and Mechanical Engineers, Sheffield, England.

Montana Society of Engineers, Butte, Mont.

North of England Institute of Mining and Mechanical Engineers,
Newcastle-upon-Tyne, England.

Oesterreichischer Ingenieur- und Architekten-Verein, Eschenbachgasse 9, Vienna, Austria.

Pacific Northwest Society of Engineers, 803 Central Building, Seattle, Wash.

Rochester Engineering Society, Rochester, N. Y.

Sachsenischer Ingenieur- und Architekten-Verein, Dresden, Germany.

Sociedad Colombiana de Ingenieros, Bogota, Colombia.

Sociedad de Ingenieros del Peru, Lima, Peru.

Societe des Ingénieurs Civils de France, 19 rue Blanche, Paris, France.

Society of Engineers, 17 Victoria Street, Westminster, S. W., London, England.

Svenska Teknologforeningen, Brunkebergstorg 18, Stockholm, Sweden.

Tekniske Forening, Vestre Boulevard 18-1, Copenhagen, Denmark.

Western Society of Engineers, 1737 Monadnock Block, Chicago, Ill.

ACCESSIONS TO THE LIBRARY

(From April 2d to May 5th, 1914)

DONATIONS*

DESIGNING AND DETAILING OF SIMPLE STRUCTURES.

By Clyde T. Morris, M. Am. Soc. C. E. Third Edition, Revised and Reset. Cloth, $9\frac{1}{2}$ x $6\frac{1}{2}$ in., illus., 11 + 260 pp. New York and London, McGraw-Hill Book Company, Inc., 1914. \$2.25.

The first edition of this book was issued in 1909, and in the preface to that edition, the author states that his aim has been to collect from the many and more exhaustive works on structural steel design, those parts which are applicable to simple structures and which can be taken up and taught in the limited time usually allotted to the subject in technical schools. He also desires to show, it is stated, by general cases and specific examples, how the simple laws of statics may be applied to the details of steel structures with the object of producing details which are in accord with the stresses they have to transmit. In this, the third, edition, and after four years' experience with the book in the classroom, the author has carefully revised the subject-matter, rearranged the chapters, changing the order of the presentation of the different topics, and added new material and illustrations. An entirely new chapter on highway bridges has been included, as well as a reprint of the Specifications for Steel Highway Bridges of the State Highway Department of Ohio. The Contents are: Designing and Estimating; Riveting; Mill Buildings; Plate Girder Bridges; Pin Connected Bridges; Details of Pin Connected Bridges; Highway Bridges; Manufacture and Erection; Appendix: General Specifications for Steel Highway Bridges, 1911, State Highway Department of Ohio; Index.

THE THEORY AND PRACTICE OF MECHANICS.

By S. E. Slocum. Cloth, $9\frac{1}{2}$ x $6\frac{1}{4}$ in., illus., 42 + 442 pp. New York, Henry Holt and Company, 1913. \$3.00.

It has been the author's aim, it is stated, to present the fundamental principles of mechanics in such a manner, in this book, as to emphasize their actual significance and relationship and, at the same time, to make them of interest to the average student of junior grade in colleges and universities, and in technical schools. In each article direct application to some practical problem is given with the explanation, and by thus properly combining theory and practice, the author states that the efficiency of instruction is greatly increased and mechanics also becomes a powerful instrument for co-ordinating mathematics and physics with technology. As this work is also intended as a reference book for the practising mechanical engineer, much has been added, it is said, which may be omitted in an elementary course of study. For a brief course the first three chapters are sufficient; for students in mechanical engineering Chapters IV and VII may be added, and for students in electrical engineering, Chapters V and VI. A feature of the book to which attention is called, is the collection of 420 practical problems most of which are original. The Contents are: Tables of Mathematical and Physical Constants; Kinematics; Fundamental Dynamical Principles; Statics; Friction and Lubrication; Kinetics of Particles; Kinetics of Rigid Bodies; Dynamics of Rotation; Index.

ECONOMICS OF INTERURBAN RAILWAYS.

By Louis E. Fischer. Cloth, $7\frac{1}{2}$ x $5\frac{1}{2}$ in., 9 + 116 pp. New York and London, McGraw-Hill Book Company, Inc., 1914. \$1.50.

In almost every community, the preface states, there are persons promoting, or encouraging the promotion of, an electric interurban railway. Many of such undertakings have been unprofitable, it is stated, because a proper scientific study of the fundamental principles governing their operating revenues and expenses, and cost of construction, has not been made, and the author, in this book, has given a résumé of actual economic results from the operation of existing electric interurban railways, in order to enable the layman or investor to comprehend more clearly the economic relations between operation and construction statistics and to discriminate between fundamentally good or bad investments in such projects. The Contents are: Inception and Development of Electric Traction; Classifications and Definitions;

* Unless otherwise specified, books in this list have been donated by the publishers.

Operating Revenue; Operating Expenses; Cost of Construction; Economic Relations, Operating Revenues, Operating Expenses, and Cost of Construction; Concluding Remarks; Index.

"THE ELECTRICIAN" ELECTRICAL TRADES' DIRECTORY AND HANDBOOK

For 1914. Thirty-Second Year. Cloth, $9\frac{1}{2} \times 6\frac{1}{2}$ in., illus., 1752 + 106 pp. London, "The Electrician" Printing and Publishing Company, Limited, 1914. 15 shillings.

This Directory which is stated to be the most complete reference book published for the electrical and allied trades, was established in 1886, and is issued annually. In this the 1914 edition substantial and useful additions to the subject-matter have been made, it is said, and in view of the growing importance of several sections, the ground covered in previous issues has been greatly extended. Among the Contents are: Obituary notices of members of the electrical and allied branches who have died from January, 1913, to January, 1914; practical information relating to patent laws, designs, and trade marks, with a list of patents expiring in 1914; useful tables, statistics, and data relating to the various phases of electrical engineering; Acts of Parliament, Board of Trade rules, and laws relating to electric traction, lighting, power, etc., as well as British, Colonial, and foreign codes governing the application of electricity in mining; laws, codes, conventions, etc., relating generally to telegraphs, telephones, and wireless telegraphy; information and names of officers of electrical companies, and constitutions and officials, etc., of the various electrical engineering associations of the world; British universities, colleges, technical schools, etc., with professors, at which the study of electricity is a feature of the curriculum; a world directory of the professions and trades connected with electricity and its application, arranged alphabetically and classified by trades and professions; and a biographical section containing short sketches of the careers of many of the leading men connected with the electrical profession; indexes; etc., etc.

AMERICAN RAILROAD ECONOMICS:

A Text-Book for Investors and Students. By A. M. Sakolski. Cloth, $7\frac{1}{2} \times 5\frac{1}{2}$ in., 12 + 295 pp. New York, The Macmillan Company, 1913. \$1.25.

The Introduction states that the economic importance of American railroads and the participation of the people as individual investors in their rapid growth and development have created a demand for the proper understanding of railroad activities and operating results. Hitherto, it is said, statistical data of this sort have been compiled by professional analysts and railroad statisticians and the aim has been to gauge railroad activities by the use of rigid standards and definite mathematical formulas. The author, however, states that his purpose throughout this book has been a critical examination of facts and figures derived from railroad reports and other publications in order to assist in a correct judgment of railroad activities and operating results, without laying down any rules or maxims, and to give to each class of railroad data an underlying purpose, compiling, classifying, and interpreting each class to accord with such purpose. After preliminary chapters devoted to railroad rates, securities, and descriptions of the important railroad systems of the world, he has classified his subject-matter, therefore, into (1) data relating to the character of transportation problems; (2) data measuring efficiency and economy of operation; (3) data measuring revenues, expenses, and net earnings; and (4) data measuring the capital investment in relation to the corporate resources and liabilities. The Contents are: Railroad Rates; Railroad Securities; Railroad Systems of the United States; Economics of Railroad Construction; Physical Factors in Economic Operation: Way and Structures; Physical Factors in Economic Operation: Railroad Rolling Equipment; Traffic Statistics; Interstate Commerce Commission's System of Railroad Accounts; The Income Account; Net Income and Its Distribution; The General Balance Sheet; Railroad Capitalization; Index.

THE ENGINEERING CATALOGUES OF POWER-PLANT EQUIPMENT

For the Year 1913, Indexed by Firms and Products. "The Specification Digest" for Use in Drawing Specifications, and Making Purchases of Power-Plant Equipment. Compiled Annually by The Engineering Magazine Company. One-half Roan, $12\frac{1}{2} \times 9\frac{1}{2}$ in., illus., 469 pp. New York, The Engineering Magazine Co., 1913.

This work is devoted, it is stated, to the field of power-plant installation, management, and superintendence, and brings into a single volume all material relating

to these particular subjects in such a manner that any item pertaining thereto may be located immediately, either by its general mechanical classification, its trade name, the name of the manufacturer, or the place of its production. The subject-matter is divided into three classes: (1) The Specification Digest which is a series of reminders of questions covering every point which the manufacturer or purchaser must answer fully and correctly in writing a specification or estimating for power-plant equipment. Following this part is a set of Standard Specifications for Horizontal Return Tubular Boilers adopted by the National Association of Tubular Boiler Manufacturers. (2) An Index to Products, under which is given alphabetically, the name of the manufacturer supplying the product, trade names, and page numbers indicating the page where descriptive and detailed information concerning the particular product may be found. (3) An Alphabetical List of the leading manufacturers and builders of power-plant equipment, whose catalogues are included in this book.

THEORY OF THE IRREDUCIBLE CASES OF EQUATIONS

And Its Application in Algebra, Geometry, and Trigonometry. By Charles Edgar White. Part II. Cloth, 9 $\frac{1}{2}$ x 6 $\frac{1}{4}$ in., illus., 5 + 90 pp. Lancaster, Pa., Published by the Author, 1913.

Many general methods have been published, the author states, for the solution of cubics and biquadratics, etc., but, except in particular cases, they all involve imaginary quantities. The only two methods for the evaluation of the irreducible case of Cardan's formula that have been published are said to be Leibnitz's method by series and Eytelwein's and Königzter's method by trigonometry. The author states that he has found, and has given in this book, an algebraic reduction of Cardan's formula by which the expression for the roots can be evaluated for any case of cubic equations for any number of decimal places. He states that many of the solutions, methods, and constructions included, are new mathematical literature, and that the solutions of equations and methods of computations given in Chapter II will be found to have a practical value in that by the formulas given trigonometric problems can be solved without the use of tables. Problems are given at the end of each chapter, and in these, it is said, may be found much that might have been included in the theoretical part of the subject-matter. The Contents are: Trigonometric Solutions of Cubics and Trigonometric Derivations of Algebraic Formulas; Approximate Solutions of Irreducible Equations and Methods of Computation; The Famous Problems in Elementary Geometry; The Inscription of Polygons; Constructions with Ruler and Compasses.

HANDY TABLES FOR COMPUTING THE COST OF TILE DRAINS.

Compiled by J. L. Parsons. Paper, 10 x 7 in., 9 pp. Humboldt, Iowa, The Author.

The first of these pages is devoted to Rules for finding average depths of trenches and for using the cost tables which are given. The following pages contain tables for finding the cost of trenching per 100 ft. at different prices per linear rod; the cost of trenching per 100 ft. at 1 cent per inch in depth per rod in length; cost of trenching per 100 ft. for different widths and depths at 30 cents per cubic yard; and for the reduction of decimals of a foot to inches.

A TEXTBOOK OF PURE MECHANISM.

By Frederick H. Sibley. Cloth, 9 $\frac{1}{2}$ x 6 $\frac{1}{4}$ in., illus., 9 + 285 pp. New York, Henry Holt and Company, 1914. \$3.00.

The preface states that no attempt has been made in this book to discuss a large number of mechanical appliances and machines, even of those in common use, the object being to select representative examples which best illustrate the geometry of machinery and to state them as briefly as possible. The classification used by the author is based, it is said, on the method of transmitting motion, which it is thought leads to a somewhat less complex treatment of the subject than that based on the method of making contact and used in several well-known textbooks. Certain fundamental rules for transmitting motion, which are stated as true of all contact motions, are given in Chapter III, and examples in subsequent parts of the text are constantly referred back to these rules. The method of treating cams and spiral gears is said to be original as far as the author knows. At the end of each chapter problems relating to the subject-matter contained in that chapter, are given. Much of the material for the text has been compiled from existing works on the subject and is said to represent little that is experimental. The Chapter headings are: Definitions; Graphical Analysis of Motion; Fundamental Rules in

Transmitting Motion; Link Connectors; Intermittent Motion by Linkwork; Wrapping Connectors; Trains of Mechanism; Transmitting Motion by Pure Rolling; Rolling and Sliding Contact; Direct Contact, Rolling and Sliding Motion, Spur Gears; Helical Gears; Index.

THE MINING WORLD INDEX OF CURRENT LITERATURE.

Vol. IV, Last Half Year, 1913. By George E. Sisley. Cloth, 9 $\frac{1}{4}$ x 6 in., 28 + 190 pp. Chicago, Mining World Company, 1914.

This Index, of which this is the fourth volume and covers the last six months of 1913, like previous ones, is said to cover the world's literature on mining, metallurgy, and kindred subjects. In it are classified all articles appearing in periodicals devoted to the subject, published in America, Europe, Africa, and Australia, together with publications of technical societies, Federal and State geological surveys and mining bureaus, as well as new books. The subject-matter is divided by classes, under which the entries are arranged alphabetically by subject and author, and includes title of article (which, if in foreign languages, is usually followed by translations or explanations in English), a brief digest where the title is vague, the name of the publication in which the article appeared or where abstracts of it may be found, the date and page number, the approximate number of words in the article, and the price. The Contents are: Publications Indexed; Metals and Metal Ores; Non-Metals; Geology and Mineralogy; Mines and Mining; Mill and Milling; Chemistry and Assaying; Metallurgy; Power and Machinery; Miscellaneous; Authors' Index; Subject Index.

STUDIES IN WATER SUPPLY.

By A. C. Houston. (Macmillan's Science Monographs.) Cloth, 9 x 6 in., illus., 12 + 203 pp. London, Macmillan and Co., Limited, 1913. \$1.60.

The author, as Director of Water Examination of the Metropolitan Water Board of London, England, for eight years, has had, it is stated, exceptional opportunities to study and observe the system of water examination, researches, tests, methods of purification, etc., as carried out by that Board, and, in this book, he has brought together the results of his personal experiences and researches in relation to water supplies and methods of purifying them, which material previously had been scattered through a considerable number of reports and papers. In his chapter on Miscellaneous Information, he gives a list of the published Reports of the Metropolitan Water Board and a list of some of the books and reports on the Metropolitan Water Supply. The Chapter headings are: Sources of Water Supply; Researches Tending to Justify Rivers as Sources of Water Supply; The Question of Abstraction; Supplementary Processes of Water Purification; Sterilization Processes with Special Reference to the "Excess-Lime" Method; Storage in Relation to Purification; Water and Disease; The Financial Value of a Pure Water Supply; Bacteriological Routine Methods; Bacteriological Special Methods; Miscellaneous Information; Index.

POWER AND CONTROL OF THE GULF STREAM:

How It Regulates the Climates, Heat and Light of the World by Protecting the Warm North-Flowing Gulf Stream from the Onslaughts of the Ice-Cold South-Flowing Labrador Current. By Carroll Livingston Riker. Morocco, 7 $\frac{1}{2}$ x 5 $\frac{1}{2}$ in., illus., 102 pp. Brooklyn, N. Y., The Scientific Press, 1912. \$2.00. (Donated by the Author.)

In this book, it is stated, the author sets forth a plan to intercept and turn the cold waters of the Labrador Current eastward at the Grand Banks of Newfoundland, by the construction of a jetty on the Banks, thereby securing to the Arctic regions some of the heat of the Gulf Stream and effecting climatic changes that would double the land values of the Northern Hemisphere. He describes the causes and effects of ocean currents and the equatorial and polar forces, as well as the location, construction, and cost of the proposed jetty. The Contents are: The Power of the Gulf Stream; The Grand Bank; The Jetty—Its Location, Construction and Effects; Manner of the Jetty Construction and Costs; Causes of Ocean Currents; Other Causes of Ocean Currents; Cause of the Gulf Stream; The Currents and Their Inclinations; The Central Sea; The Retroceding Strata; Effects of the Winds upon Ocean Currents; Influence of the Gulf Stream Upon the Inclinations of the Earth in Its Solar Orbit, and Some of Its Effects; Vertical Circulation of the Ocean and the Atmosphere; Index.

MACHINERY'S HANDBOOK FOR MACHINE-SHOP AND DRAFTING-ROOM:

A Reference Book on Machine Design and Shop Practice for the Mechanical Engineer, Draftsman, Toolmaker and Machinist. Second Edition. Morocco, $7\frac{1}{2}$ x $4\frac{1}{2}$ in., illus., 1400 pp. New York, The Industrial Press, 1914. \$5.00.

From time to time, every great trade, the preface states, should collect, systematize, and publish its established principles and working data, and, in this handbook, the compilers have sought to do this for the useful arts of machine design, construction, and operation. The subject-matter, it is stated, is the best of material which it has taken twenty years to collect, much that is published for the first time, and valuable information from hundreds of books and catalogues that have been searched for data to amplify or complete particular subjects. As stated in the secondary title, the book is intended for the use of the mechanical engineer, draftsman, toolmaker, and machinist, and although conditions, methods, and processes vary in machine-shop practice, it is hoped that the valuable information contained herein may prove useful to the whole mechanical field. A partial list of Contents is: Mathematical Tables; Logarithms; Mechanics; Strength of Materials; Riveting and Riveted Joints; Strength and Properties of Steel Wire and Wire Ropes; Springs; Shafting; Friction; Bearings, Keys and Keyways; Clutches and Couplings; Friction Brakes; Cams and Cam Design; Gearing; Belts and Pulleys; Rope and Chain Transmission; Crane Chain and Hooks; Bolts, Nuts, and Machine Details; etc., etc.

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Bibliography of Road Making and Roads in the United Kingdom.
 By Dorothy Ballen. With an Introduction by Sir George Gibb. P. S. King & Son, London, 1914.

Das Entwerfen und Berechnen der Verbrennungskraftmaschinen und Kraftgas-Anlagen. Von Hugo Guldner. Dritte neubearbeitete und bedeutend erweiterte Auflage. Julius Springer, Berlin, 1914.

Forschungsarbeiten auf dem Gebiete des Ingenieurwesens. Herausgegeben vom Verein Deutscher Ingenieure. Hefte 147, 148, und 149. Julius Springer, Berlin, 1914.

Forscherarbeiten auf dem Gebiete des Eisenbetons: Die Berechnung der frei aufliegenden, rechteckigen Platten. Von Heinrich Leitz. Heft 23. Wilhelm Ernst & Sohn, Berlin, 1914.

Lehrbuch des Maschinenbaues. Von Karl Esselborn. Erster Band: Materialienkunde, Festigkeitslehre, Maschinenzeichnen, Maschinen-elemente, Kolbemaschinen, Windmotoren und Kreiselmaschinen, Dampfkessel und Gasgeneratoren. Bearbeitet von L. Klein, A. Nachtweh, und J. Maercks. Wilhelm Engelmann, Leipzig, 1911.

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The Theory of Heat Engines. By William Inchley. Longmans, Green and Co., New York and London, 1913.

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Handbook for Heating and Ventilating Engineers. By James D. Hoffman, Assisted by Benedict F. Raber. McGraw-Hill Book Co., New York and London, 1913.

Railroad Curves and Earthwork. By C. Frank Allen. Fifth Edition, Revised. McGraw-Hill Book Company, New York and London, 1914.

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SUMMARY OF ACCESSIONS

(From April 2d to May 5th, 1914)

Donations (including 14 duplicates).....	433
By purchase.....	31
Total	464

MEMBERSHIP

ADDITIONS

(From April 3d to May 7th, 1914)

HONORARY MEMBER		Date of Membership.
PICKETT, WILLIAM DOUGLAS.	228 Campsie Pl., Lexington, Ky.	July 6, 1853 Hon. M. April 1, 1914

MEMBERS

BERGENDAHL, GUSTAV STORM.	Pres., Bergendahl-Knight Co., 1311 Harris Trust Bldg., Chicago, Ill.	Assoc. M. M.	April 3, 1907 April 1, 1914
BLACK, RALPH PETERS.	Engr., M. of W., Kanawha & Mich. Ry., Charleston, W. Va.	Assoc. M. M.	Nov. 8, 1909 April 1, 1914
BUERGER, CHARLES BERNARD.	Prin. Asst. Engr., George W. Fuller, 170 Broadway, New York City.	Assoc. M. M.	April 4, 1911 April 1, 1914
BULLEN, JACOB THOMPSON.	Senior Engr., U. S. Office of Public Rds., Box 772, Shreveport, La.		April 1, 1914
CHARLES, LA VERN JOHN.	Asst. Constr. Engr., Elephant Butte Dam, Elephant Butte, N. Mex.	Assoc. M. M.	April 4, 1911 April 1, 1914
HULSE, SHIRLEY CLARK.	Bedford, Pa.	Jun. Assoc. M. M.	Oct. 7, 1902 Feb. 6, 1907 Mar. 4, 1914
LEX, WASHINGTON IRVING.	Asst. Engr., Bridge Designing and Estimating Dept., Am. Bridge Co., 1508 North 19th St., Philadelphia, Pa.	Assoc. M. M.	May 2, 1906 April 1, 1914
LINNELL, HERBERT PRESCOTT.	Vice-Pres. and Chf. Engr., Atlantic, Gulf & Pacific Co. Manila, Philippine Islands.	Assoc. M. M.	May 2, 1906 Feb. 4, 1914
LLEWELLYN, LEE.	Chf. Engr., Pittsburgh Coal Washer Co., 812 Fulton Bldg., Pittsburgh, Pa.		April 1, 1914
MACCULLOCH, CHARLES HARVEY.	Res. Engr., New York State Barge Canal, Barge Canal Office, Albany, N. Y.		April 1, 1914
MACREDIE, JOHN ROBERT CLARKE.	Asst. Engr., C. P. Ry., Prussia, Saskatchewan, Canada.	Assoc. M. M.	Feb. 28, 1911 Dec. 31, 1913
OTT, SAMUEL JACOB.	In Chg., New York Bridge Designing and Estimating Office, Am. Bridge Co., 9 Mortimer Ave., Ruth-erford, N. J.	Assoc. M. M.	Feb. 6, 1907 April 1, 1914
SHEPLEY, CHARLES ROGERS.	Engr. and Supt. of Constr., Emerson-Brantingham Co., 2607 Chicago Ave., Minneapolis, Minn.		Dec. 31, 1913

MEMBERS (*Continued*)

		Date of Membership.
TILLINGHAST, FREDERICK HOWARD.	Res. Engr., Lahontan Dam, U. S. Reclamation Service, Lahontan, Nev.	Assoc. M. May 1, 1907 M. April 1, 1914
WAITE, HENRY MATSON.	City Bldg., Dayton, Ohio	April 1, 1914

ASSOCIATE MEMBERS

BALDWIN, FRANCIS BEAL.	Asst. Engr., Tex. & Pac. Ry., 316 Sixth St., Alexandria, La.	April 1, 1914
BROOKS, JOHN NIXON.	Associate Engr. with Nicholas S. Hill, Jr., 224 West State St., Trenton, N. J.	Jun. Nov. 8, 1909 Assoc. M. April 1, 1914
COGHLAN, RAPIER REDMOND.	Mfg. Cement Chemist, U. S. Reclamation Service, Elephant Butte, N. Mex.	Nov. 12, 1913
COLEMAN, LESTER LYMAN.	Supt., Charles C. Moore & Co.; City Engr., Maricopa, Kern Co., Cal.	Jun. May 31, 1910 Assoc. M. April 1, 1914
COMPTON, ARTHUR MANDEVILLE.	Engr. in Chg., Levee Impvt. Work, 26 Whitaker Bldg., Davenport, Iowa.	April 1, 1914
COOPER, DEXTER PARSHALL.	101 Park Ave., New York City.	April 1, 1914
CURRIE, CLARE HARMON.	Drainage and Municipal Engr., Webster City, Iowa.	April 1, 1914
DEAN, WILLIS JOHNSON.	Structural Engr., 619 Timken Bldg., San Diego, Cal.	April 1, 1914
DILWORTH, EDWARD COE.	Contr. Engr., Structural Dept., Pittsburgh-Des Moines Steel Co., 5806 Howe St., Pittsburgh, Pa.	Assoc. June 6, 1911 Assoc. M. Dec. 3, 1913
DRAKE, HENRY PHILKINS.	Hydrographer, Hydro-Elec. Co. of West Virginia, 504 Bank for Savings Bldg., Pittsburgh, Pa.	Dec. 3, 1913
EIDE, TORRIS.	Asst. Engr., Designing Div., Board of Water Supply, City of New York, 22d Floor, Municipal Bldg., New York City.	Jun. Sept. 6, 1910 Assoc. M. April 1, 1914
GEORGE, HOWARD HOWELL.	Asst. Engr., M. of W., Public Service Ry., 316 Public Service Bldg., Newark, N. J.	April 1, 1914
GOODWILLIE, DAVID HERRICK.	1047 Spitzer Bldg., Toledo, Ohio.	April 1, 1914
HAIG, CECIL SHIELDS.	Box 463, San Gabriel, Cal.	Mar. 4, 1914
HAMILTON, ROSS ELROY.	Div. Engr., Dept. of Public Works of Ohio, 341 South 10th St., Coshocton, Ohio.	April 1, 1914
HICKS, WILLIAM FREDERICK.	Supt. of Operation and Maintenance, Dept. of Natural Resources, Lethbridge System, C. P. Ry., A. R. & I. Bldg., Lethbridge, Alberta, Canada.	April 1, 1914

ASSOCIATE MEMBERS (Continued)		Date of Membership.
HOLLIDAY, ROBERT FLEMING.	Chf. of Estimating Dept., The New Jersey Zinc Co., Palmerton, Pa.	April 1, 1914
HONE, AUGUSTUS CRANE.	Chf. Engr., M. W. Thompson, 111 Broadway, Suite 2115, New York City.	April 1, 1914
LEBEDEFF, MICHAEL NIKANOROVITCH.	Designing Engr., The Goldsborough Co., 514 First National Bank Bldg., Denver, Colo.	April 1, 1914
LINSLEY, CHARLES WELLS.	Commr. of Works, City Hall, Oswego, N. Y.	April 1, 1914
MACDOUGALL, DAVID CADENHEAD.	Div. Engr., Public Service Ry. of New Jersey, 554 Lenox Ave., Westfield, N. J.	April 1, 1914
MILLER, WILLARD PRESTON.	Engr. in Chg., Manila Ry. Co. (1906), Ltd., Hondagua, <i>via</i> Lopez, Tayabas, Philippine Islands.	Dec. 3, 1913
MORRISON, ROBERT OBRELL.	City Engr., Box 206, Monroe, La.	April 1, 1914
PETERSON, GARFIELD CHRISTIAN.	Glenbeulah, Wis.	Oct. 2, 1906
REINHART, MARTIN JOHN.	Pres., The Reinhart & Donovan Co., 725 Insurance Bldg., Oklahoma, Okla.	April 1, 1914
RENshaw, ROBERT HENRY, JR.	Contr. (Chesapeake Constr. Co.), Preston, Md.	Dec. 31, 1913
SAYER, DANIEL BELL.	Contr. Engr. (Major & Sayer), Wellsville, N. Y.	Mar. 4, 1914
SCHWENDENER, KARL DE WITT.	Chf. Engr., Dept. of Bldgs., 2062 West 27th St., Los Angeles, Cal.	April 1, 1914
SLOAN, SAMUEL ALAN.	Asst. Engr., P. R. R., 665 Broad St. Station, Philadelphia, Pa.	April 1, 1914
SPAULDING, RALPH EDGAR.	Eng. Contr. (E. N. & R. E. Spaulding), Suffield, Conn.	May 31, 1910
STEEVES, CLARENCE MCNAUGHTON.	Constr. Engr., The Maritime Dredging & Constr. Co., Ltd., P. O. Box 336, Saint John, N. B., Canada.	April 1, 1914
TROUT, ALEXANDER LINN.	Asst. Engr., Albert Kahn, 31 Campau Bldg., Detroit, Mich.	Dec. 31, 1913
VAN WAGENEN, JAMES HUBERT.	Prin. Asst. Engr., International Boundary Commissions, 100 B St., N. E., Washington, D. C.	April 1, 1914
WADE, NEWTON BENJAMIN.	City Engr., 429 East Vine St., Millville, N. J.	Dec. 3, 1912
WILEY, RODMAN.	Bridge Engr., Dept. of Public Rds., Commonwealth of Kentucky, Frankfort, Ky.	April 1, 1914
WOEHRLIN, GEORGE JOHN.	Civ. Engr. and Archt., 1502 President St., Brooklyn, N. Y.	April 1, 1914

JUNIORS	Date of Membership.
ARMSTRONG, HARRY ARTHUR. Care, University Club, Sacramento, Cal.....	Mar. 4, 1914
BAILHACHE, JOHN GOODIN. Eng. Computor, J. H. Dockweiler, Cons. Engr., 2901 Scott St., San Francisco, Cal.....	Mar. 4, 1914
GILMAN, EDGAR DOW. Care, University Club, Madison, Wis.	April 1, 1914
JAENICKE, WILLIAM HUGO. Asst. Res. Engr. on Highway Constr., California Highway Comm., 1121 Cole St., San Francisco, Cal.....	Mar. 4, 1914
JESSUP, WALTER EDGAR. 1005 Brent Ave., South Pasadena, Cal.....	April 1, 1914
JOHNSON, HARVEY STONE. Engr., M. of W., New York State Rys., Utica Lines, Utica, N. Y.....	April 1, 1914
LANE, EMORY WILSON. No. 202, Y. M. C. A., Ithaca, N. Y..	Mar. 4, 1914
MCLOUGHLIN, FREDERIC OZANAM XAVIER. 260 Convent Ave., New York City.....	April 1, 1914
MAYPER, VICTOR. Eng. Draftsman, Public Service Comm., First Dist., State of New York, 253 West 112th St., New York City.....	April 1, 1914
MEISE, GEORGE JOHN. 3320 Barker Ave., New York City..	April 1, 1914
MOYLAN, LEONARD KYRAN. 619 Fourth St., Troy, N. Y....	Mar. 4, 1914
OLSON, JOHN NATHANAEL. Office Engr., The J. C. Feild Eng. Co., 105 Feild Bldg., Denison, Tex.....	Nov. 12, 1913
SHEPPARD, NORMAN KIRKWOOD. 220 North Michigan Ave., Saginaw, Mich.....	Dec. 3, 1913
STALLINGS, JOHN ROBERT. Paragould, Ark.....	Nov. 12, 1913
SWARTZ, LEON EMERSON. Care, City Engr., Altoona, Pa..	April 1, 1914
SYLLIAASEN, MELVIN OLIVER. Structural Draftsman, City Engr.'s Office, 15 Ward St., Seattle, Wash.....	Feb. 4, 1914

CHANGES OF ADDRESS

MEMBERS

AUCHINCLOSS, WILLIAM S. Atlantic Highlands, N. J.
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BEDFORD, THOMAS ARCHIBALD. Div. Engr., California Highway Comm., Dunsmuir, Cal.
BELLINGER, LYLE FREDERICK. Civ. Engr., U. S. N.; Public Works Officer, U. S. Navy Yard, Portsmouth, N. H.
BERRY, JOHN BENNINGTON. Room 1640, Transportation Bldg., Chicago, Ill.
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BRADY, SAMUEL DUNLAP. Chf. Engr., Little Kanawha Syndicate Lines, Fairmont, W. Va.

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CORNER, CHARLES. Royal Societies' Club, 63 St. James St., London, S. W., England.

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CREUZBAUR, ROBERT WALTER. Cons. Engr. of Public Works, Woolworth Bldg., New York City.

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Farley, PHILIP PATRICK. 807 Myrtle Ave., Albany, N. Y.

FIELD, GEORGE RUSSELL. Vice-Pres. and Gen. Mgr., Klamath River Packing Co., Requa, Cal.

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GILCHRIST, CHARLES ALLYN. Care, E. B. Gilchrist, 501 Harrison Bldg., Philadelphia, Pa.

GOODALE, LOOMIS FARRINGTON. Inspecting Engr., Board of Public Utility Commrs., Manila, Philippine Islands.

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HARDY, HARRY. Apartado 837, San José, Costa Rica.

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HATCH, JAMES NOBLE. Structural Engr. for Sargent & Lundy, 1412 Edison Bldg., Chicago, Ill.

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HERINGTON, GEORGE B. Engr. of Constr., Los Angeles Terminal Station, Care, H. V. Platt, Asst. Gen. Mgr., S. P. Co., Los Angeles, Cal.

HOLGATE, HENRY. Cons. Engr., 59 Beaver Hall Hill, Montreal, Que., Canada.

MEMBERS (*Continued*)

HOWE, WILSON TYLER. 21 Oakland St., Salem, Mass.

HUGHES, HECTOR JAMES. Prof. of Civ. Eng., Harvard Univ., and Cons. Engr., 114 Pierce Hall, Cambridge, Mass.

IDE, WILLIAM STONE. Care, Am. Woolen Mills, Fulton, N. Y.

KEEFER, CHARLES HENRY. (*Director.*) Union Bank Bldg., Room 710, Ottawa, Ont., Canada.

KENDALL, CHARLES HANFORD. U. S. Senior Highway Engr., Ogden, Utah.

KENDRICK, JULIAN WAY. City Engr., City Hall, Birmingham, Ala.

LAHMER, JOHN ALOYSIUS. 515 Pennsylvania Ave., San Diego, Cal.

LAYFIELD, ELWOOD NORMAN. Lock Box 1294, Houston, Tex.

MCCARTHY, GEORGE ARNOLD. Care, Kerry & Chace, Ltd., 411 Confederation Life Bldg., Toronto, Ont., Canada.

McCONNELL, JOHN LORENZO. Supt. and Constr. Engr., Holabird & Roche, 5213 Kenwood Ave., Chicago, Ill.

MANSON, MARSDEN. Bellota, Cal.

MARTIN, DANIEL HOWARD. Constr. Engr., James H. Corbett, Port Robinson, Ont., Canada.

MASON, GEORGE COTNER. Engr. and Contr., Northwestern Bank Bldg., Portland, Ore.

MILLS, CHARLES MALON. 524 South 46th St., Philadelphia, Pa.

OBER, RALPH HADLOCK. Cons. Engr., 407 Central Bldg., Seattle, Wash.

PARMELEE, CHARLES LESTER. Cons. Engr., Woolworth Bldg., New York City.

PATTEN, HENRY BENJAMIN. 1854 Wyoming Ave., Washington, D. C.

POLAND, WILLIAM BARCOCK. Care, J. G. White & Co., Inc., 43 Exchange Pl., New York City.

POLK, ARMOUR CANTRELL. 530 South Crockett St., Sherman, Tex.

RAFF, HENRY GOTTLIEB. Cons. Engr., Room 2503, Park Row Bldg., New York City.

RANDOLPH, ISHAM. Cons. Engr., Room 1827, Continental & Commercial National Bank Bldg., Chicago, Ill.

ROBERTS, SHELBY SAUFLEY. Cons. Engr. (Berry, Howard & Roberts), 1640 Transportation Bldg., Chicago, Ill.

ROTHROCK, WILLIAM POWELL. Engr. of Erection, Fort Pitt Bridge Works, 234 East 178th St., New York City.

SEAMAN, HENRY BOWMAN. Cons. Engr., Woolworth Bldg., New York City.

SIBERT, WILLIAM LUTHER. Lt.-Col., Corps of Engrs., U. S. A., Office of the Chf. of Engrs., U. S. A., Washington, D. C.

SMITH, CHARLES WILLIAM. 1476 Broadway, New York City.

STERN, ISAAC FARBER. Cons. Engr., 1525 Old Colony Bldg., Chicago, Ill.

STEVENS, JOHN CYPRIAN. 605 Spalding Bldg., Portland, Ore.

STUART, ALFRED ALLEN. Cons. Engr., Degnon Contr. Co.; Secy., Degnon Realty & Terminal Impvt. Co., 30 East 42d St., New York City.

SWIFT, WILLIAM EVERETT. With Ford, Bacon & Davis, 115 Broadway, New York City (Res., Hartsdale, N. Y.).

(Former) MEMBERS (Continued)

THOMAS, WILLIAM JOHN. Chf. Engr., Geo. B. Post & Sons, 101 Park Ave. (Res., 1814 Weeks Ave.), New York City.

TUTTLE, ARTHUR SMITH. (Director.) Deputy Chf. Engr., Board of Estimate and Apportionment, Municipal Bldg., New York City.

WHITMAN, EZRA BAILEY. Cons. Engr. (Greiner & Whitman), 1308 Fidelity Bldg., Baltimore, Md.

WILLIAMS, FRANK MARTIN. Chf. Engr., The Portage County Impvt. Assoc., Ravenna, Ohio.

WORLEY, JOHN STEPHEN. Member, Eng. Board, Interstate Commerce Comm., Kansas City, Mo.

ASSOCIATE MEMBERS

ALLEN, HAROLD DAYTON. Asst. Engr., C. R. R. of N. J., 52 Broadway, Room 1124, New York City (Res., 361 Clifton Ave., Newark, N. J.).

ANSON, WILLIAM FREDERICK ALFRED. County Engr., Box 132, Lebanon, Va.

AYERS, AUGUSTINE HAINES. Supt. of Constr., Sun River Project, U. S. Reclamation Service, Gilman, Mont.

BARTLETT, CHARLES TERRELL. Cons. Engr. (Bartlett & Ranney, Inc.); Cons. and Bridge Engr., Bexar County, Court House, San Antonio, Tex.

BEAL, GEORGE SAFFORD. Asst. Engr., Water Supply Comm. of Pennsylvania, Harrisburg, Pa.

BEESON, ALEXANDER CONN. Chf. Engr. for the Receivers, Pittsburgh-Buffalo Co., 150 East Maiden St., Washington, Pa.

BENSON, HENRY CRIST. Res. Engr., Hardaway Contr. Co., Tallulah Falls, Ga.

BILGER, HARRY EDMUND. 919 West Lawrence Ave., Springfield, Ill.

BILLINGSLEY, JAMES WARTELLE. Cons. Engr., Interstate Bank/Bldg., New Orleans, La.

BOUCHER, WILLIAM JAMES. With Degnon Contr. Co., 30 East 42d St., New York City.

BOYD, WALTER LACY. 66 Parker St., Bartow, Fla.

BRIGHT, DUDLEY SEYMOUR. 1302 Chelton Ave., Brookline, Pittsburgh, Pa.

BROOKE, GEORGE DOSWELL. Supt., B. & O. Southwestern R. R., Chillicothe, Ohio.

BROWN, CLAUDE OSGOOD. 406 Federal Bldg., Tacoma, Wash.

BUNDY, OSCAR HAROLD. Chf. of Party, Valuation Dept., So. Ry., Apartment 73, The New Berne, 12th and Massachusetts Ave., N. W., Washington, D. C.

BURNELL, EUGENE. 2330 East 9th St., Des Moines, Iowa.

CHARLsworth, WILLIAM SAXON. Gisborne, New Zealand.

CHEVALIER, LOUIS. Bridge Engr., Seaboard A. L. Ry., 1220 Royster Bldg., Norfolk, Va.

COOPER, DAVID REGINALD. Hydr. Engr., 2 Rector St., New York City.

COYNE, HARRY LEWIS. Asst. Engr., Public Service Comm., First Dist., 820 Ferry St., Woodhaven, N. Y.

ASSOCIATE MEMBERS: (Continued)

CRAIG, JOSEPH EDWIN. Hydr. Engr. of Jacksonville, 1528 Liberty St., Jacksonville, Fla.

DANIELS, THOMAS REMINGTON HOLDEN. Engr., Terre Haute, Indianapolis & East. Traction Co., Indianapolis, Ind.

DANN, ALEXANDER WILLIAM. 5599 Baum Boulevard, Pittsburgh, Pa.

DAUGHERTY, HENRY MICHAEL. Constr. Supt., J. G. White & Co., Inc., 63 Young Bldg., Honolulu, Hawaii.

DAVIS, EDSON JOSEPH. Care, Alaska Gastineau Min. Co., Juneau, Alaska.

DAVIS, JAMES LYFORD. Superv. of Highways, Bennington County, Manchester Center, Vt.

DELAY, THEODORE STUART. County and City Engr., Creston, Iowa.

DENT, ELLIOTT JOHNSTONE. Capt., Corps of Engrs., U. S. A., Room 707, Army Bldg., New York City.

DIGNUM, HARRY JOCELYN. Engr., Guantanamo Sugar Co., Guantanamo, Cuba.

DOBSON, GILBERT COLFAX. Asst. Engr., Quartermaster Dept., Culebra, Canal Zone, Panama.

DRAGER, WALTER LOUIS. 2381 Clermont St., Denver, Colo.

DRAYTON, NEWBOLD. Care, Chili Exploration Co., Chiquicamata, Chili.

DUTTON, CHARLES HENRY. With Rhode Island Co., 94 Congdon St., Providence, R. I.

EPPS, FREDERICK WILLIAM. Designing Engr., Bridge Dept., Kansas City Terminal Ry., Kansas City, Mo.

FAIN, JAMES RHEA. Morristown, Tenn.

FRASER, GUY OWEN. With Haviland, Dozier & Tibbets, 1845 Berryman St., Berkeley, Cal.

FREEMAN, MILTON HARVEY. Asst. Engr., Board of Water Supply, New York City, 353 St. Pauls Ave., Stapleton, N. Y.

FRY, HOWELL LEWIS. Engr. of Constr., Brazil Ry., Caixa Postal 1100, São Paulo, Brazil.

FURLOW, FELDER. Asst. Engr. in Chg., Southern Dist. Constr. Dept., So. Ry., 1219 Am. Trust Bldg., Birmingham, Ala.

GALLAGHER, JOSEPH. Care, U. S. Engr. Office, Mobile, Ala.

GARDNER, ARCHIBALD. Supt. of Constr., Ambursen Co., Kent, Ohio.

GARDNER, WARREN. Asst. Engr., Board of Water Supply, Brown Station, N. Y.

GIESTING, FRANK ALEXANDER. Cons. Engr., 52 Rock Ridge Boulevard, Oakland, Cal.

GORHAM, FRED ALLEN. Asst. Engr., U. S. Reclamation Service, Fort Shaw, Mont.

GREENLAW, RALPH WELLER. Engr., Smith, Hauser, Locher & Co., 2338 University Ave., New York City.

HARTRIDGE, EARLE MENELAS. Care, Walter W. Vick, Receptor General, Santo Domingo, Santo Domingo.

HASBROUCK, OSCAR. Hudson, N. Y.

ASSOCIATE MEMBERS (*Continued*)

HAYNE, DANIEL CARLOS. Asst. City Engr. (Res., 2364 North Pennsylvania St.), Indianapolis, Ind.

HEIDEL, BENJAMIN FRANKLIN. Senior Highway Engr., Office of Public Rds., U. S. Dept. of Agriculture, Washington, D. C.

HINKLE, ALBERT HARRISON. Deputy Highway Commr., 1722 Summit St., Columbus, Ohio.

HIRST, ARTHUR. 30 Church St., New York City.

HOPKINS, ALBERT LLOYD. Pres., Newport News Shipbuilding & Dry Dock Co., 233 Broadway, Room 2605, New York City.

JENNINGS, PERCY JOHN. Inspecting Engr., Irrig. Office, Dept. of the Interior, P. O. Box 2318, Calgary, Alberta, Canada.

JOHNSON, NATT MADISON. City Engr., Montpelier, Vt.

JOHNSON, ROBERT CHAN. Supt. of Ways and Works, Canton-Samshui Ry., Shek Wai Tong, Canton, China.

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VAN NAME, JOSEPH MASON. Huntington, N. Y.

JUNIORS

BARNES, HENRY WILFRID. 17 Newton Rd., Bayswater, W., London, England.

BEEBE, JOHN CLEAVELAND. Engr. in Chg., Power and Pumping Investigations, Idaho Irrig. Co., Ltd., Richfield, Idaho.

BILYEU, CHARLES SMITH. New York Representative, Colby & Christie, 51 East 42d St., New York City.

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DE CHARMS, RICHARD, JR. Care, D. H. Brown, Engr. in Chg., Ocean Steamship Co., Savannah, Ga.

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DUNAN, GEORGE EDMUND. Apalachicola, Fla.

ENGLISH, HAROLD LEWIS. Lisbon, N. H.

ESTES, LEWIS ALDEN. 31 South 15th St., Richmond, Ind.

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GILKISON, GORDON MERCER. Care, Utah Power & Light Co., Salt Lake City, Utah.

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HUBBARD, DANIEL. Constructional Engr., Uyuni-Tupiza Line, Care, Bolivia Ry., Oruro, Bolivia.

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MENGEL, CARL WAYNE. Engr.-in-Chg., Land Reclamation Dept., John L. Roper Lumber Co., Wenona, N. C.

MONK, PERCY SHELLEY. Care, Interstate Commerce Comm., Div. of Valuation, Chattanooga, Tenn.

MORGAN, JOSEPH HOLLOWAY. Junior Engr., U. S. Geological Survey, 1741 F St., N. W., Washington, D. C.

MORRISON, ROGER LEROY. 814 Park Ave., Baltimore, Md.

MUCHEMORE, HARRIE LANGDON. Engr., Commary Peterson Co., Mashbey Bldg. (Res., 2843 Green St.), San Francisco, Cal.

MUNKELT, FREDERICK HERRMANN. Care, Petroleum Iron Works Co., Sharon, Pa.

NEWKIRK, SAMUEL FRANK. 233 West 20th St., Erie, Pa.

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STRANDBERG, GEORGE ROBERT. 220 West 57th St., New York City.

TATE, ROBERT L'HOMMEDIEU. Kenmore, N. Y.

TAYLOR, SENECA VERN. Draftsman, Russell Wheel & Foundry Co., 225 Marston Court, Detroit, Mich.

TILLIT, PEDRO ERNESTO. Barrauco, Peru.

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WRIGHT, RENE BARBER. 609 Miller Ave., Portland, Ore.

REINSTATEMENTS

	MEMBER	Date of Reinstatement.
MERSEREAU, CHARLES VERNON.....		April 1, 1914
WILDER, ALVIN DUMOND.....	JUNIOR	Dec. 31, 1913

DEATHS

ARTHUR, HOWARD ELMER. Elected Member, November 8th, 1909; died April 18th, 1914.

BRINK, LAWRENCE CALVIN. Elected Associate Member, October 7th, 1908; died May 2d, 1914.

CAMPBELL, DUNCAN HUGH. Elected Associate Member, July 1st, 1909; died March 29th, 1914.

DAVIS, PHILIP CHAPIN. Elected Associate Member, June 4th, 1913; died March 26th, 1914.

FRAZIER, JAMES LEWIS. Elected Member, September 1st, 1880; died February 28th, 1914.

GERBER, EMIL. (*Director.*) Elected Member, February 1st, 1888; died April 16th, 1914.

JOHNSON, THOMAS H. Elected Member, September 5th, 1877; died April 16th, 1914.

NELSON, GEORGE ALFRED. Elected Member, April 4th, 1911; died June 3d, 1913.

NOBLE, ALFRED. (*Past-President.*) Elected Junior, September 2d, 1874; Member, April 3d, 1878; died April 19th, 1914.

OASTLER, WILLIAM CHURCHILL. Elected Associate, March 31st, 1891; died, March 31st, 1914.

THOMPSON, FRED. Elected Member, October 1st, 1902; died April 22d, 1914.

TINTORER Y GIBERGA, JOSEPH. Elected Member, May 5th, 1880; died January 8th, 1914.

ZABRISKIE, AARON J. Elected Junior, July 1st, 1885; died April 15th, 1914.

Total Membership of the Society, May 7th, 1914,**7411.**

MONTHLY LIST OF RECENT ENGINEERING ARTICLES OF INTEREST.

(April 2d to May 5th, 1914)

NOTE.—*This list is published for the purpose of placing before the members of this Society, the titles of current engineering articles, which can be referred to in any available engineering library, or can be procured by addressing the publication directly, the address and price being given wherever possible.*

LIST OF PUBLICATIONS

In the subjoined list of articles, references are given by the number prefixed to each journal in this list:

- (1) *Journal, Assoc. Eng. Soc., Boston, Mass.*, 30c.
- (2) *Proceedings, Engrs. Club of Phila., Philadelphia, Pa.*
- (3) *Journal, Franklin Inst., Philadelphia, Pa.*, 50c.
- (4) *Journal, Western Soc. of Engrs., Chicago, Ill.*, 50c.
- (5) *Transactions, Can. Soc. C. E., Montreal, Que., Canada.*
- (6) *School of Mines Quarterly, Columbia Univ., New York City, 50c.*
- (7) *Gesundheits Ingenieur, München, Germany.*
- (8) *Stevens Institute Indicator, Hoboken, N. J.*, 50c.
- (9) *Engineering Magazine, New York City*, 25c.
- (11) *Engineering (London), W. H. Wiley, New York City*, 25c.
- (12) *The Engineer (London), International News Co., New York City*, 35c.
- (13) *Engineering News, New York City*, 15c.
- (14) *Engineering Record, New York City*, 10c.
- (15) *Railway Age Gazette, New York City*, 15c.
- (16) *Engineering and Mining Journal, New York City*, 15c.
- (17) *Electric Railway Journal, New York City*, 10c.
- (18) *Railway Review, Chicago, Ill.*, 15c.
- (19) *Scientific American Supplement, New York City*, 10c.
- (20) *Iron Age, New York City*, 20c.
- (21) *Railway Engineer, London, England*, 1s. 2d.
- (22) *Iron and Coal Trades Review, London, England*, 6d.
- (23) *Railway Gazette, London, England*, 6d.
- (24) *American Gas Light Journal, New York City*, 10c.
- (25) *Railway Age Gazette, Mechanical Edition, New York City*, 20c.
- (26) *Electrical Review, London, England*, 4d.
- (27) *Electrical World, New York City*, 10c.
- (28) *Journal, New England Water-Works Assoc., Boston, Mass.*, \$1.
- (29) *Journal, Royal Society of Arts, London, England*, 6d.
- (30) *Annales des Travaux Publics de Belgique, Brussels, Belgium*, 4 fr.
- (31) *Annales de l'Assoc. des Ing. Sortis des Ecoles Spéciales de Gand, Brussels, Belgium*, 4 fr.
- (32) *Mémoires et Compte Rendu des Travaux, Soc. Ing. Civ. de France, Paris, France.*
- (33) *Le Génie Civil, Paris, France*, 1 fr.
- (34) *Portefeuille Économiques des Machines, Paris, France.*
- (35) *Nouvelles Annales de la Construction, Paris, France.*
- (36) *Cornell Civil Engineer, Ithaca, N. Y.*
- (37) *Revue de Mécanique, Paris, France.*
- (38) *Revue Générale des Chemins de Fer et des Tramways, Paris, France.*
- (39) *Technisches Gemeindeblatt, Berlin, Germany*, 0, 70m.
- (40) *Zentralblatt der Bauverwaltung, Berlin, Germany*, 60 pf.
- (41) *Electrotechnische Zeitschrift, Berlin, Germany.*
- (42) *Proceedings, Am. Inst. Elec. Engrs., New York City*, \$1.
- (43) *Annales des Ponts et Chaussées, Paris, France.*
- (44) *Journal, Military Service Institution, Governors Island, New York Harbor*, 50c.
- (45) *Colliery Engineer, Scranton, Pa.*, 25c.
- (46) *Scientific American, New York City*, 15c.
- (47) *Mechanical Engineer, Manchester, England*, 3d.
- (48) *Zeitschrift, Verein Deutscher Ingenieure, Berlin, Germany*, 1, 60m.
- (49) *Zeitschrift für Bauwesen, Berlin, Germany.*
- (50) *Stahl und Eisen, Düsseldorf, Germany.*
- (51) *Deutsche Bauzeitung, Berlin, Germany.*
- (52) *Rigasche Industrie-Zeitung, Riga, Russia*, 25 kop.
- (53) *Zeitschrift, Oesterreichischer Ingenieur und Architekten Verein, Vienna, Austria*, 70n.
- (54) *Transactions, Am. Soc. C. E., New York City*, \$12.
- (55) *Transactions, Am. Soc. M. E., New York City*, \$10.
- (56) *Transactions, Am. Inst. Min. Engrs., New York City*, \$6.

(57) *Colliery Guardian*, London, England, 5d.
 (58) *Proceedings, Engrs.' Soc. W. Pa.*, 2511 Oliver Bldg., Pittsburgh, Pa., 50c.
 (59) *Proceedings, American Water-Works Assoc.*, Troy, N. Y.
 (60) *Municipal Engineering*, Indianapolis, Ind., 25c.
 (61) *Proceedings, Western Railway Club*, 225 Dearborn St., Chicago, Ill., 25c.
 (62) *Industrial World*, 59 Ninth St., Pittsburgh, Pa., 10c.
 (63) *Minutes of Proceedings, Inst. C. E.*, London, England.
 (64) *Power*, New York City, 5c.
 (65) *Official Proceedings, New York Railroad Club*, Brooklyn, N. Y., 15c.
 (66) *Journal of Gas Lighting*, London, England, 6d.
 (67) *Cement and Engineering News*, Chicago, Ill., 25c.
 (68) *Mining Journal*, London, England, 6d.
 (69) *Der Eisenbau*, Leipzig, Germany.
 (71) *Journal, Iron and Steel Inst.*, London, England.
 (71a) *Carnegie Scholarship Memoirs, Iron and Steel Inst.*, London, England.
 (72) *American Machinist*, New York City, 15c.
 (73) *Electrician*, London, England, 18c.
 (74) *Transactions, Inst. of Min. and Metal.*, London, England.
 (75) *Proceedings, Inst. of Mech. Engrs.*, London, England.
 (76) *Brick*, Chicago, Ill., 10c.
 (77) *Journal, Inst. Elec. Engrs.*, London, England, 5s.
 (78) *Beton und Eisen*, Vienna, Austria, 1, 50m.
 (79) *Forscherarbeiten*, Vienna, Austria.
 (80) *Tonindustrie Zeitung*, Berlin, Germany.
 (81) *Zeitschrift für Architektur und Ingenieurwesen*, Wiesbaden, Germany.
 (82) *Mining and Engineering World*, Chicago, Ill., 10c.
 (83) *Gas Age*, New York City, 15c.
 (84) *Le Ciment*, Paris, France.
 (85) *Proceedings, Am. Ry. Eng. Assoc.*, Chicago, Ill.
 (86) *Engineering-Contracting*, Chicago, Ill., 10c.
 (87) *Railway Engineering and Maintenance of Way*, Chicago, Ill., 10c.
 (88) *Bulletin of the International Ry. Congress Assoc.*, Brussels, Belgium.
 (89) *Proceedings, Am. Soc. for Testing Materials*, Philadelphia, Pa., \$5.
 (90) *Transactions, Inst. of Naval Archts.*, London, England.
 (91) *Transactions, Soc. Naval Archts. and Marine Engrs.*, New York City.
 (92) *Bulletin, Soc. d'Encouragement pour l'Industrie Nationale*, Paris, France.
 (93) *Revue de Métallurgie*, Paris, France, 4 fr. 50.
 (94) *The Boiler Maker*, New York City, 10c.
 (95) *International Marine Engineering*, New York City, 20c.
 (96) *Canadian Engineer*, Toronto, Ont., Canada, 10c.
 (98) *Journal, Engrs. Soc. Pa.*, Harrisburg, Pa., 30c.
 (99) *Proceedings, Am. Soc. of Municipal Improvements*, New York City, \$2.
 (100) *Professional Memoirs, Corps of Engrs.*, U. S. A., Washington, D. C., 50c.
 (101) *Metal Worker*, New York City, 10c.
 (102) *Organ für die Fortschritte des Eisenbahnwesens*, Wiesbaden, Germany.
 (103) *Mining and Scientific Press*, San Francisco, Cal., 10c.
 (104) *The Surveyor and Municipal and County Engineer*, London, England, 6d.
 (105) *Metallurgical and Chemical Engineering*, New York City, 25c.
 (106) *Transactions, Inst. of Min. Engrs.*, London, England, 6s.
 (107) *Schweizerische Bauzeitung*, Zürich, Switzerland.
 (108) *Southern Machinery*, Atlanta, Ga., 10c.
 (109) *Journal, Boston Soc. C. E.*, Boston, Mass., 50c.
 (110) *Journal, Am. Concrete Inst.*, Philadelphia, Pa., 50c.
 (111) *Journal of Electricity, Power and Gas*, San Francisco, Cal., 25c.

LIST OF ARTICLES

Bridges.

Report of Committee of the American Concrete Institute on Reinforced Concrete Highway Bridges and Culverts. (110) Jan.
 Construction of the Indo-Ceylon Connection.* (15) Mar. 18.
 Illinois River Bridge at La Salle.* (15) Mar. 18.
 Methodical Inspection of Railway Bridges. (23) Mar. 20.
 A Double-Deck Bascule Bridge (Canadian Pacific Ry. over Kaministiquia River).* (23) Mar. 27.
 Morris County Turnpike Arch at Hopatcong, N. J., D. L. & W. R. R.* A. M. Wolf. (67) Apr.
 Lake Park Bridge, Milwaukee, Wis.* O. B. Young, Jr. (67) Apr.
 Design and Construction Features of the Tunkhannock Creek Viaduct on the D. L. & W. R. R. at Nicholson, Pa. C. W. Simpson. (86) Apr. 1.
 Reconstruction of Canadian Pacific Bridge over the St. Lawrence near Lachine.* (13) Apr. 2.

*Illustrated.

Bridges—(Continued).

Underpinning a Settling Bridge Pier.* Pusey Jones. (13) Apr. 9.

A Small Suspension Bridge Wrecked by Unsuitable Cable Fastening at the Anchorage.* (13) Apr. 9.

Willamette River Bridge at Newberg, Oregon.* (14) Apr. 11.

The New Havel Bridge, Berlin.* C. Van Langendonck. (19) Apr. 11.

Recent Improvements by the Indiana Union Traction Company, Bridge over Woodward St., New Castle.* (17) Apr. 11.

Some Design and Erection Features of the Superstructure of the Salmon Bay Bascule Bridge in Seattle, Wash.* H. A. Gerst. (86) Apr. 15.

Bridge Failure at Attica, Indiana.* Albert Smith. (13) Serial beginning Apr. 16.

The Reconstruction of Southwark Bridge.* (12) Apr. 17.

Re-Erecting the St. Francois River Bridge, Quebec.* (15) Apr. 17.

Concrete Plants used on the Rome Improvement. Numerous Small Bridges Built from Central Layout, with Interchangeable Auxiliary Equipment for Isolated Structures.* (14) Apr. 18.

Quebec Bridge Anchor-Arm Spans.* (14) Apr. 18.

Construction of Milwaukee Avenue Viaduct, Chicago.* J. H. Prior. (15) Apr. 24.

Concrete Protection for Street Bridge.* (14) Apr. 25.

Methods and Costs of Constructing a 450-ft. Reinforced Concrete Viaduct of the Beam and Girder Type at Fort Worth, Texas.* E. W. Robinson. (86) Apr. 29.

Design of the Superstructure of the New Quebec Bridge.* H. P. Borden. (13) Apr. 30.

Analysis of Statically Indeterminate Flat Arches.* V. J. Elmont. (96) Apr. 30.

Building New Pennsylvania Bridge over the Maumee River at Toledo in Record Time.* R. C. Miller. (14) May 2.

Construction of Gunpowder River Bridge, Nearly a Mile of Reinforced Concrete Flat Slab Spans Built on Piers with Foundations in Shallow Water and Deep Mud.* (14) May 2.

Les Travaux de Reconstruction du Pont Notre-Dame sur la Seine, à Paris.* Henri Brot. (33) Mar. 28.

Cintre pour la Démolition des Ponts Par-Dessus en Maçonnerie.* M. Cochet. (38) Apr.

Die Hoangho-Brücke.* Bruno Schulz. (48) Serial beginning Feb. 14.

Die Ausbildung der Knoten von Vierendeelträgern.* Mehrtens. (69) Apr.

Zusammenstellung der Größten Brücken Russlands.* E. O. Patton. (69) Apr.

Eisenbetonbogenbrücken im Landschaftsbild.* R. Heim. (78) Apr. 2.

Elektrische Schiffahrtsignal-Beleuchtung auf einigen Brücken Berlins.* G. R. Mylo. (41) Apr. 2.

Die Halenbrücke bei Bern.* (107) Serial beginning Apr. 11.

Die Nebenspannungen der Hängebrücken mit steifem Kettenzug.* L. Brugsch. (40) Apr. 15.

Bauausführung der Ueberführung der Gäubahn über Vorort- und Gütergleise Feuerbach und die Ludwigsburger Strasse. K. W. Schaechterle. (78) Serial beginning Apr. 21.

Electrical.

Electricity: the Continuation of a Short Paper Addressed to Colliery Managers. Robert Nelson. (Paper read before the North Staffordshire Inst. of Min. and Mech. Engrs.) (106) Vol. 47, Pt. 1.

Recent Extensions of the Birmingham Electric Supply Department.* (73) Mar. 27.

The Steidle Telephone System.* (73) Mar. 27.

The Corwin Semi-Automatic Telephone System.* (73) Mar. 27.

Power Economics for Intermittent Loads.* E. Ivor David. (From Paper read before the Rugby Eng. Soc.) (22) Mar. 27.

Power Situation in Oregon.* W. H. Crawford. (111) Mar. 28.

Desirable Qualities of Illumination. G. H. Stickney. (111) Serial beginning Mar. 28.

Electromagnetic Radiation. Louis Cohen. (3) Apr.

The Fire Hazard in Turbo-Generators. G. S. Lawler. (55) Apr.

Concrete Poles.* (67) Apr.

Steam Boiler Working in Electrical Power Stations.* J. W. Jackson. (77) Apr. 1.

Methods and Costs of Incandescent Electric Welding.* C. B. Auel. (72) Apr. 2.

On the Absorption of Light in Mercury-Vapour Lamps and an Arrangement to Avoid It.* F. P. Kerschbaum. (73) Apr. 3.

Lightning Conductors and Their Tests. Frederic H. Taylor. (Paper read before the Junior Institution of Engrs.) (29) Apr. 3; (47) Apr. 24.

Wireless Telegraphy on Trains.* (12) Apr. 3.

Large Electric Furnaces for Pig Iron, the Helfenstein Furnace at Domnarfsvets.* A. Helfenstein. (Abstract of paper read before the Christiania Polytechnic Assoc.) (22) Apr. 3.

Savannah Electric Company's Turbine Station.* (27) Apr. 4.

18, 1982 (141) "argued that 'there should be a clear and consistent distinction between the 'market' and 'non-market' dimensions of economic activity, and that the former should be subject to market rules and the latter to non-market rules'" (p. 111).¹

18, 1982 (141) "argued that 'the market principle should not be applied to all economic activity, but only to those economic activities which are compatible with the principles of efficiency and the rule of law'" (p. 112). In 1982, the Chinese government also proposed that "the market principle should not be applied to all economic activities, but only to those economic activities which are compatible with the principles of efficiency and the rule of law" (p. 113).²

18, 1982 (141) "argued that 'the market principle should not be applied to all economic activities, but only to those economic activities which are compatible with the principles of efficiency and the rule of law'" (p. 113).²

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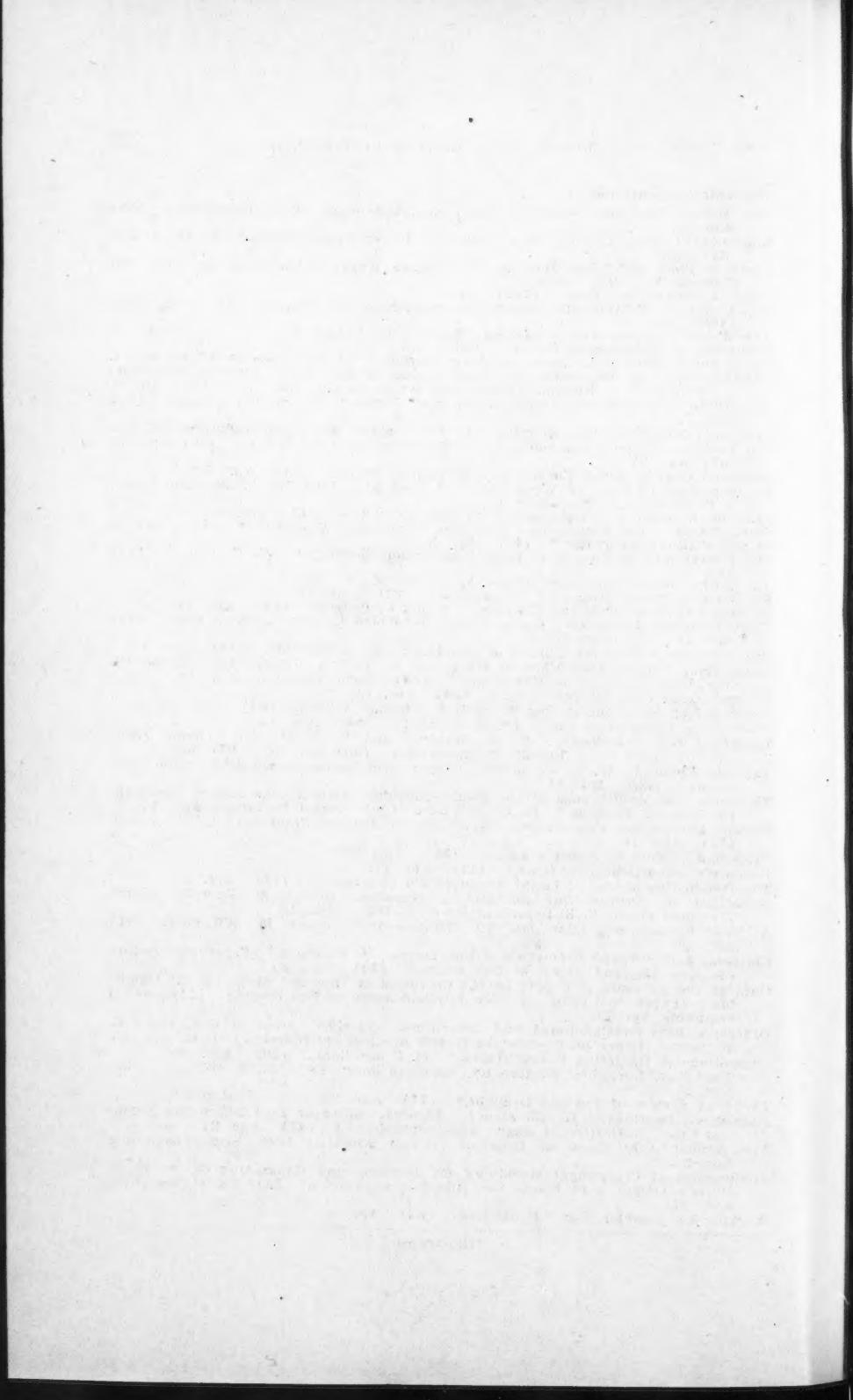
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Public Policy of Public Utility Corporations. H. S. Cooper. (111) Apr. 11.

High Tribunal Recognizes "Going Value" in Kings County Lighting Case. (14) Apr. 11; (13) Apr. 2.

Supervising the Execution of Large Percentage Contracts to Protect the Clients' Interests. G. G. Omannay. (13) Apr. 30.

Artificial Daylight.* Herbert E. Ives. (3) May.

Special Representations in Specifications Control, General Cautionary Clauses, Recent Decision of the United States Supreme Court, Reversing the Court of Claims. William B. King. (14) May 2.

Notice Nécrologique sur Charles Tellier. G. A. Leroy. (32) Jan.

Les Lacs de Soude Naturelle.* P. Kestner. (32) Feb.

Le Système Taylor.* Ch. de Frémiville. (92) Mar.

Die Schallstärkemessung. R. Berger. (7) Mar. 14.

Municipal.

Methods of Paving Construction in Baltimore, Md.* Harry D. Williar, Assoc. M. Am. Soc. C. E. (60) Apr.

Brick Pavements: Their Maintenance and Repairs. F. F. Townsend. (60) Apr.

Municipal Improvement for 1914. (60) Apr.

Creosoted Yellow Pine Block Pavements in Dallas, Tex.* (60) Apr.

The Municipal Asphalt Paving Plant of Spokane, Wash.* (60) Apr.

Bituminous Pavements in Wilmington, Del.* (60) Apr.

Concrete Alley Pavements. John N. Edy. (60) Apr.

Methode of Making Surveys and Plans for Trunk Line Highways in Michigan. Harry L. Brightman. (Paper read before the Michigan Eng. Soc.) (86) Serial beginning Apr. 1.

Method and Cost of Constructing Slag Roads near Pascagoula, Miss. Charles E. Chidsey. (86) Apr. 1.

Roads of Brick or Concrete instead of Macadam for New York State Highways. (13) Apr. 2.

The Problem of Street Cleaning. S. Whinery. (From the *American City*.) (96) Apr. 2.

and, in addition, will be used in their respective local governments.

It will be the duty of the State Board of Education to keep the State Auditor and the State Comptroller advised of the amount of money required and to furnish the Auditor and Comptroller with a copy of the State Budget.

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Municipal—(Continued).

Have Bituminous Methods of Construction Solved the Modern Road Problem? W. H. Maxwell. (Paper read before the Institution of Mun. and County Engrs.) (104) Apr. 3.

Reverting Specification for Paving Bitumens. H. P. Pullar. (Abstract of paper read before the Mich. Eng. Soc.) (14) Apr. 4.

Kinks in Concrete-Road Construction. C. D. Franks. (Abstract of paper read before the Indiana Eng. Soc.) (14) Apr. 4.

Improvement of Chislett Street, Pittsburgh, Method of Supporting a Street over an Earth Slide by Using a Special Reinforced-Concrete Retaining Wall and Platform.* N. S. Sprague. (14) Apr. 4.

Methods and Costs of Constructing Gravel and Sand-Clay Roads in Perry County, Alabama. George C. Scales. (86) Apr. 8.

Some Good Roads, Their Construction and Maintenance. Robert C. Muir. (96) Serial beginning Apr. 9.

Methods and Cost of Laying 5 689 Sq. Yd. of Vitrified Brick Pavement at Carlisle, Pa.* John C. Hiteshew. (86) Apr. 15.

Design and Construction of Earth Roads in Iowa.* T. R. Agg. (13) Apr. 16.

Concrete Road Crossing a Flood Plain.* A. H. Hunter. (Abstract of paper read before the Ill. Soc. of Engrs. and Surv.) (14) Apr. 18.

Practical Instructions to State Aid Road Foremen in Wisconsin.* A. R. Hirst. (Abstract from *Bulletin No. 4, Wisconsin State Highway Comm.*) (86) Apr. 22.

Modern Road Work. H. P. Boulnois. (Paper read before the Roads Improvement Assoc. of Leicestershire, England.) (96) Apr. 23.

Sand-Clay vs. Macadam for Roads in the Southern States. (13) Apr. 23.

Recent Public Works at Chelmsford.* Percival T. Harrison. (Paper read before the Institution of Mun. and County Engrs.) (104) Apr. 24.

Summary of Street Traffic Conditions in a Number of Large Cities. (86) Apr. 29.

Protection of New Pavements against Destruction by Trenching, Macon, Ga. (13) Apr. 30.

New Specifications for Concrete Pavements, New York State Highway Commission.* (13) Apr. 30.

La Route Moderne. A. Sallé. (35) Serial beginning Apr.

Steinpflaster in Asphaltstrassen bei Verlegung von Gleisen. Günther. (39) Mar. 20.

Wie fördern wir praktisch das Siedlungswesen Gross-Berlins?* Fritz Beuster. (39) Apr.

Spiel- und Sportplatzanlage für Uelzen.* Victor Schmahl. (39) Apr. 5.

Railroads.

Freight Train Handling. F. B. Farmer. (61) Jan. 20.

Heavy Track Scale on Buffalo, Rochester and Pittsburgh.* (15) Mar. 19.

The Electrification of the Usui-Toge Railway, Japan.* (From the A. E. G. *Journal*.) (23) Serial beginning Mar. 27.

4-6-0 Express Goods Engines, Caledonian Railway.* (21) Apr.

A Note on Staggered and Squared Rail Joints as Applied to Railway Tracks.* A. J. Beaton. (Paper read before the South African Soc. of Civ. Engrs.) (21) Apr.

A 2 000 I. H. P. Motor Locomotive.* (21) Apr.

Interesting Mikado Type Locomotive. W. H. Winterrowd. (25) Apr.

Northern Pacific Stock Car.* (25) Apr.

New Haven Steel Coach.* (25) Apr.

Brake Efficiency Tests on Steel and Iron Wheels. F. K. Vial. (25) Apr.

Grinding Wheels and Their Use. A. R. Davis. (25) Apr.

Improved Hanna Locomotive Stoker. (25) Apr.; (15) Apr. 3.

Panama Railroad Cross-Ties. (87) Apr.

Specifications for Scales.* M. H. Starr. (Paper read to the Am. Ry. Bridge and Bldg. Assoc.) (87) Apr.

British Locomotives in 1913.* J. F. Gairns. (88) Apr.

Electric Traction on the Simplon Railway.* Bruno Kilchenmann. (From *Bulletin de l'Association Suisse des Electriciens*.) (88) Apr.

Wooden Sleepers or Iron Sleepers. Ed. Lang. (From *Zeitung des Vereins deutscher Eisenbahnverwaltung*.) (88) Apr.

Congestion of Traffic. J. Hansen. (From *Zeitung des Vereins deutscher Eisenbahnverwaltung*.) (88) Apr.

Electrification of Railroads in Switzerland.* E. Huber-Stockar. (65) Apr.

Light Signals.* C. O. Harrington, Jr. (3) Apr.

The Investigation of Railroad Accidents. Charles R. Vanneman. (36) Apr.

Preliminary Estimates in Connection with Railroad Work. Carl A. Gould. (36) Apr.

Construction of the Watauga & Yadkin Valley R. R.; with Details of Methods and Costs of Earth and Rock Excavation.* H. C. Landon. (86) Apr. 1.

Cost of Track Laying with a Track Machine. (86) Apr. 1.

The First 2 400-Volt Direct Current Railroad Switchboard.* (13) Apr. 2.

Railroads—(Continued).

Recent Improvements of the Boston & Maine Railroad in the Connecticut River Valley.* (13) Apr. 2.

The Rogers Pass Tunnel.* (13) Apr. 2; (96) Apr. 23.

Railway Shelter Stations of Unit Concrete Construction.* (13) Apr. 2.

Why Eastern Railways Need Higher Freight Rates. Daniel Willard. (Paper read before the Traffic Club of Pittsburgh.) (15) Apr. 3.

Pennsylvania's Improvements at North Philadelphia.* (15) Apr. 3.

The Rate Advance Hearings before the Interstate Commerce Comm. (15) Apr. 3.

Studies of Operation, the Pittsburgh & Lake Erie.* (23) Apr. 3.

Extension of the Charging Cross, Euston & Hampstead Railway.* (23) Apr. 3.

Railroad-Yard Lighting. (14) Apr. 4.

Shop Improvements of the Michigan Central R. R. at St. Thomas, Ont.* (18) Apr. 4.

Superheat.* E. J. Nicholson. (18) Apr. 4.

Stresses in the Plates of Cast-Iron Car Wheels.* Louis E. Endsley. (18) Apr. 4.

The 1200-Volt High-Speed Passenger Locomotives on the Oakland, Antioch & Eastern Railway.* (17) Apr. 4.

The Rainy Lake Fill: an Episode in the Building of a Three-Thousand Mile Railroad.* Rex Croasdell. (19) Apr. 4.

Single Phase for the Rhaetian Railway.* (17) Apr. 4.

The 1200-Volt D. C. Véberetsch Railway.* William C. Gyaros. (17) Apr. 4.

Flashlight Railway Signals. (13) Apr. 9.

The Position of the Pennsylvania Railroad. Samuel Rea. (Paper read before the Interstate Commerce Comm.) (15) Apr. 10.

New Dynamometer Car for the Baltimore & Ohio.* (15) Apr. 10.

The Possibility of Future Increases in Train Loads. Charles F. Speare. (15) Apr. 10.

The Construction of the Northwestern Pacific.* (15) Apr. 10.

The Railways' Attitude on Private Car Lines. (15) Apr. 10.

New Dock Facilities of the Hocking Valley Ry. at East Toledo, Ohio.* (18) Apr. 11.

Maintenance of Equipment Expense, Pennsylvania R. R. J. T. Wallis. (From Report to the Interstate Commerce Comm.) (18) Apr. 11.

Increase in Maintenance of Way Expenses on the P. R. R. J. G. Rodgers. (From Report to the Interstate Commerce Comm.) (18) Apr. 11.

Electric Traction on Lookout Mountain.* E. D. Reed. (17) Apr. 11.

New Double-Track Signals on the New York State Railways. (17) Apr. 11.

Converting a Tunnel into an Open Cut; Southern Pacific Ry.* George W. Wade. (13) Apr. 16.

Rail Breakages and Track Wave Motion in Cold Weather. (13) Apr. 16.

New Dining Cars, London & South-Western Railway.* (23) Apr. 17.

Water-Power for Railways in Sweden. (From Report of the Hydrographical Bureau of Stockholm.) (11) Apr. 17.

Operating Capacity of Single Track Divisions. W. M. Baxter. (15) Apr. 17.

Philadelphia & Reading 4-4-0 Type Locomotive.* (15) Apr. 17.

Extensive Reduction in Canadian Rates Ordered. (Board of Ry. Commrs. of Canada.) (15) Apr. 17.

Extensive Great Northern Snow Shed Construction.* (15) Apr. 17.

New Soo Line Freight Terminal in Chicago.* (18) Apr. 18.

Some Interesting Features of the Recent Derailment on the New York, New Haven & Hartford R. R.* (13) Apr. 23.

Comparative Study in Operation, Virginian and C. C. & O.* (15) Apr. 24.

Depreciation of Locomotives and Shop Equipment.* L. R. Pomeroy. (Abstract of paper read before the New England R. R. Club.) (15) Apr. 24.

Railways in China.* (12) Serial beginning Apr. 24.

Eight-Coupled Goods Engines for the Somerset and Dorset Joint Line.* (12) Apr. 24.

The New York, New Haven and Hartford Railway.* (12) Serial beginning Apr. 24.

New 4-6-2 Locomotive, Pennsylvania Railroad.* (23) Apr. 24.

Signalling Practice on the Eastern Bengal State Railway.* W. R. Bennett. (23) Apr. 24.

Heavy Freight Car Repair Facilities, L. S. & M. S. Ry., Ashtabula, Ohio.* (18) Apr. 25.

New Station for Panama R. R. at Panama.* (18) Apr. 25; (87) Apr.

Gasoline Locomotive for the Georgia Coast & Piedmont R. R.* (18) Apr. 25.

Illumination of Railway Signals. Thomas S. Stevens. (Abstract of paper read before the Illuminating Eng. Soc.) (13) Apr. 30.

Railway Track Scales and Weighing Methods.* Herbert T. Wade. (9) May.

Fuel Instruction Car on the Northern Pacific.* (15) May 1.

New Santa Fe Line near San Bernardino, Cal.* (15) May 1.

Rules Governing Weighing of Carload Freight. (15) May 1.

New Haven Improves Method of Electric Operation. William Arthur. (15) May 1.

Railroads—(Continued).

Christy Steel Freight Car Roof.* (15) May 1.
 Triple Articulated Locomotive, Erie R. R.* (18) May 2.
 New Freight and Engine Terminals, Air Line Junction, Ohio, L. S. & M. S. Ry.* (18) May 2.
 Steel Passenger Car for the Canadian Pacific Ry.* (18) May 2.
 American Type Locomotives for the Philadelphia & Reading Ry.* (18) May 2.
 Reduction of Inductive Interference from the Power Lines of the New Haven Railroad. (17) May 2.
 Minimizing Induction from Single-Phase Railway, New York, New Haven & Hartford R. R.* (27) May 2.
 Appareils d'Attelage Automatique pour Wagons Primés au Concours de Paris (1912). (33) Mar. 28.
 Double Croisement de Voies sur la Ligne du Great Southern Railway, à Buenos Ayres.* Ch. Béranger. (35) Apr.
 Le Chemin de Fer Transafrican : son Tracé, les Méthodes de Construction et d'Exploitation d'après les Résultats des Dernières Missions.* R. Legouëz et R. Jullidière. (38) Apr.
 L'Usine Electrique à Gaz Pauprre de la Compagnie du Chemin de Fer d'Orléans, à Tours.* H. Parodi. (33) Apr. 4.
 L'Influence de la Retassure et de la Ségrégation sur la Résistance des Rails.* Ch. Dantin. (33) Apr. 11.
 Neue Bauformen und Bauausführungen in Beton und Eisenbeton bei der württembergischen Staatsseisenbahn-Verwaltung.* K. W. Schaechterle. (51) Serial beginning Sup. No. 7.
 Wiederherstellung beschädigter Schraubenkuppelungen. Engelbrecht. (102) Mar. 15.
 Zur Eisenbahn- und Schiffahrt-Frage in Kamerun.* (102) Apr. 1.
 Die neue Bergbahn von Baden-Baden.* Frid. Rimmele. (40) Apr. 2.
 Über das Rohrinnen im Lokomotivkessel.* Oskar Prinz. (53) Apr. 10.
 Lagerung feuergefährlicher Flüssigkeiten, Bauart Pintsch. (102) Apr. 15.
 Schienenstähle auf klefernen Schwellen.* C. Bräuning. (102) Apr. 15.
 Befahren einer Langsamfahrstelle am Unterrichtsmodelle. Hans A. Martens. (102) Apr. 15.
 Vierachsige Bahnpostwagen der schweiz. Postverwaltung.* (107) Apr. 18.

Railroads, Street.

The Buenos Ayres Subway.* (23) Mar. 20.
 Advancement in the Street and Interurban Railway Industry.* Benjamin C. Tilton. (36) Apr.
 The Design of Rolling Stock for Electric Railways.* H. E. O'Brien. (77) Apr. 1.
 Concrete Pole Tests in Syracuse.* (17) Apr. 4.
 East Side Tunnel of the Rhode Island Co., Providence.* Heaton R. Robertson. (13) Apr. 9.
 Concrete-Mixing Car for Reinforced Decayed Poles.* A. J. Purinton. (17) Apr. 11.
 The New Standard Grooved Girder Rail Section.* Martin Schreiber. (17) Apr. 11.
 Report on Traffic Congestion in Fall River, Mass.* (Abstract of Report of D. C. and Wm. B. Jackson.) (17) Apr. 14.
 Center-Entrance, End-Exit Cars for Pittsburgh.* (17) Apr. 11.
 Passing of the Providence Counterweight Cable Road.* (13) Apr. 16.
 The Passenger Transportation Problem. J. M. McElroy. (Report to the Manchester Tramways Dept.) (26) Apr. 24; (104) Apr. 3.
 The Boksburg (Transvaal) Railless Traction System.* R. Turnbull Mawdesley. (26) Apr. 24.
 Sand-Handling by the Philadelphia Rapid Transit Company.* (17) Apr. 25.
 Electrolysis Prevention in Edmonton, Alta.* W. T. Woodrooffe. (17) Apr. 25.
 Traffic Statistics in Pittsburgh.* (17) Apr. 25.
 The East River Tunnels of the New Rapid Transit Lines in New York.* (13) Apr. 30.
 Cantilever Canopies for Platform Shelters on the Chicago Elevated Railways.* (13) Apr. 30.
 Chicago's Experience with Solid and Insert Manganese Special Track Work.* (17) May 2.
 Overhead Problems, Spans, Brackets and Curves.* Charles Rufus Harte. (17) May 2.
 Philadelphia Transit Construction; Typical Designs for New Subway and Elevated Structures to Cost \$57 578 000.* (14) May 2.
 The Turbine Power Plant of the Louisville Railway Company.* W. O. Rogers. (64) Serial beginning May 5.
 La Traction Electrique et le Système de Traction Auto-Régulateur (S. T. A. R.).* Paul Sauvage. (32) Feb.
 Der Schienenreinigungswagen der städtischen Strassenbahn Zürich.* F. Largiadèr. (107) Apr. 18.

Sanitation.

The Necessity of Ventilation. Meyer J. Sturm. (4) Mar.

Doncaster Refuse Destructor.* (104) Mar. 27.

The Calder Vale, Wakefield, Sewage Disposal Works. J. P. Wakeford. (Paper read before the Institution of Mun. and County Engrs.) (104) Mar. 27.

Hygiene and the Use of Ozone for Ventilation. Czaplewski. (Paper read before the Congress for Heating and Ventilating.) (105) Apr.

Design of the East Side Sewage Pumping Station, Hartford, Conn.* W. S. Brewer. (From paper read before the Connecticut Soc. of Civ. Engrs.) (86) Apr. 1.

Hypochlorite Water Disinfection and Typhoid Fever in Eight Cities. (13) Apr. 2.

Report Recommending Methods of Collection and Disposal of Municipal Refuse of Chicago. Irwin S. Osborn and John T. Fetherston. (Report made to the Chicago City Waste Comm.) (86) Apr. 8; (14) Apr. 11.

Operation of the Sewage Disposal Works at Atlanta, Ga. R. M. Clayton and W. A. Hansell, Jr. (Paper read before the Am. Assoc. for the Advancement of Science.) (86) Apr. 8.

Measuring Sewer Flow by a 26-ft. Sharp-Crested Weir.* (13) Apr. 9.

A Diagram for Solving McMath's Storm Sewer Formula.* R. W. Stewart. (13) Apr. 9.

The Bactericidal, Deodorizing and Physiological Effects of Ozone. F. V. Woolridge. (13) Apr. 9.

Removable Winter Inclosure for Sprinkling Sewage Filters, Gloversville, N. Y.* H. J. Hanmer. (13) Apr. 9.

Report on Collection and Disposal of Waste, Toronto. Geo. B. Wilson. (Report to the Board of Health of Toronto.) (96) Apr. 9.

New York Sewage Problem, Metropolitan Commission and Emscher Tanks. (104) Apr. 10.

A Discussion of the Present Status of Water Supply and Sewage Disposal Conditions in Chicago. (86) Apr. 15.

Typhoid and Paratyphoid along the Richelieu River. Theo. J. Lafreniere. (13) Apr. 16.

Reconstruction and Relief of the Rocky Branch Sewer; St. Louis, Mo.* W. W. Horner. (13) Apr. 16.

Transmission of Heat Through Building Materials.* Frank L. Busey. (64) Apr. 21.

Surveys and Plans for a Comprehensive Land Reclamation and Drainage Project.* (86) Apr. 22.

Removing and Washing Sand from Sewage Grit Chamber, New Bedford, Mass.* Walter N. Charles. (13) Apr. 23.

Operation of Imhoff Tanks. Charles Gilman Hyde. (14) Apr. 25.

Costs and Methods of Building Large Sewers.* H. R. Abbott. (Abstract of paper read before the Ill. Soc. of Engrs. and Surv.) (14) Apr. 25.

Method and Cost of Constructing an 18-in. Inverted Syphon for Sewer Crossing of Letort Spring, Carlisle, Pa. C. A. Bryan (86) Apr. 29.

Discussion and Data on the Correlation of Water-Borne and Some Other Preventable Diseases. C. M. Hilliard. (Paper read before the Indiana Sanitary and Water Supply Assoc.) (86) Apr. 29.

The Fertilizing Value of Sewage and Sewage Sludge. (13) Apr. 30.

Municipal Refuse Sorting and Utilization Plant, Pittsburgh, Penn.* Sterling H. Bunnell. (13) Apr. 30.

Kansas City Specifications for Sewer Pipe, and Experience in Testing Sewer Pipe.* Elwood S. Wallace. (13) Apr. 30.

Plumbing in a University Laboratory, Yale.* (101) May 1.

Sanitary Statistics for Michigan, Survey of Treatment Costs and Relation of Typhoid Death Rate to Water Supply, Size of Community and Density of Population. (14) May 2.

Deep Sewer Work at Minot, North Dakota.* J. R. Graham. (Abstract of paper read before the North Dakota Soc. of Engrs.) (14) May 2.

Wirtschaftliche Gesichtspunkte bei der Anlage von Fernwärmewässerheizungen, insbesondere wirtschaftliche Ermittlung des Rohrdurchmessers und der Wassermenge. Ernst Pfleiderer. (7) Serial beginning Mar. 7.

Ueber die Selbstreinigung der Gewässer und eine neue Methode der Reinigung städtischer Abwässer. Oskar Haempel. (53) Mar. 20.

Das Fernheizwerk unter Berücksichtigung der Abwärmeverwertung.* E. Nagel. (7) Mar. 21.

Luft- und Wasserreinigung durch Ozon. J. C. Olsen. (Tr. abstract from *Heating and Ventilating Magazine*.) (7) Mar. 28.

Die Selbstlüftung der Wohnräume und ihr Einfluss auf die Heizung. C. A. Gullino. (7) Mar. 28.

Städtische Kanalisationen.* W. Miller. (7) Apr. 4.

Kanalisationskosten. Hache. (7) Apr. 4.

Die Verwendung von Zementbetonröhren für Kanalisationszwecke und Druckversuche betr. Festigkeit dieser Materialien.* Zimmermann. (7) Serial beginning Apr. 4.

Sanitation—(Continued).

Kanalisierung der Stadt Herborn, Nassau.* A. Schumann. (7) Serial beginning Apr. 4.

Zur Beurteilung der Wirkung von Abwasserreinigungsanlagen mit besonderer Berücksichtigung der neuendings von der VIII. englischen "Koniglichen Kommission" auf gestellten Grenzwerte. O. Kammann. (7) Serial beginning Apr. 4.

Bestimmung der Abflussmengen in städtischen Kanälen.* Müller. (39) Apr. 5.

Jauche-oder Abfallwassergruben.* (80) Apr. 9.

Einiges aus dem Gebiete der Wärmeüberleitung.* M. Grellert. (7) Apr. 11.

Unterirdische Behälter für Strassenkehricht und Sand. F. Zink. (7) Apr. 11.

Die städtische hygienischen Anlagen von Rio de Janeiro. Friedr. Freise. (7) Apr. 11.

Structural.

Tests to Determine Lateral Distribution of Stresses in Wide Reinforced Concrete Beams.* W. A. Slater. (110) Jan.

The Cement Gun and Its Work.* Carl Weber. (4) Mar.

A Campaign to Prevent Fire. Franklin H. Wentworth. (4) Mar.

Mixing and Distributing Concrete by Compressed Air.* (15) Mar. 18.

The New Midland Adelphi Hotel, Liverpool.* (23) Mar. 20.

Mixing and Placing Concrete. W. F. Strouse. (87) Apr.

The Quantity System of Estimating the Best Basis for Building Contracts. G. Alexander Wright. (Paper read before the Technical Society of the Pacific Coast.) (1) Apr.

The Effect of Saturation on the Strength of Concrete. J. L. Van Ornum. (Paper read before the Engrs. Club of St. Louis.) (1) Apr.

Extinguishing of Fires in Oils and Volatile Liquids. Edw. A. Barrier. (55) Apr.

Condition of Frame of Tower Building, New York, after 25-Yr. Service.* (13) Apr. 2.

Royal Bank Building Foundation Work.* (96) Apr. 2.

Concrete Specifications in Detroit Building Code; Amendments Passed March 17 Relative to Columns and Girderless Flat-Slab Floors. (14) Apr. 4.

Founding a Building over Coal-Mine Workings. Geo. E. Stevenson. (13) Apr. 9.

A New Development in Factory Buildings.* O. J. Abell. (20) Apr. 9.

The Uncertainty of Test Bars from Composition Castings.* W. F. Prince. (72) Apr. 9.

Paraffin Bodies in Coal Tar Creosote and Their Bearing on Specifications. S. R. Church and John Morris Weiss. (Paper read before the Am. Assoc. for the Advancement of Science.) (96) Apr. 9.

Compression Tests on Woods.* Percy W. Smith. (12) Apr. 10.

Cracking of Drawn Brass. Ernst Jonson. (14) Apr. 11.

Specifications for Sand, Based on Tests made at the Engineering Experiment Station of the University of Illinois. (14) Apr. 11.

Commercial Designing of Structures. Daniel J. Haner. (96) Apr. 16.

Special Steel Sash, Hill Building, New York City.* (13) Apr. 16.

Exploded Cement Piles for Soft Foundation.* (22) Apr. 17.

Equitable Building Foundations, Concrete Piers with Footings 18 Feet Below Cutting Edges of Pneumatic Caissons Sunk Through 45 Feet of Sand and Water.* (14) Apr. 18; (13) Apr. 23.

Underpinning Work-House Adjacent to Tilting Grain Elevator at Transcona.* (14) Apr. 18.

Oil and Paint Storage Building at Baltimore.* (17) Apr. 18.

A Method of Computation for Excavation Tables.* Albert S. Fry. (86) Apr. 22.

Decay of Wood Posts Encased in Concrete.* Henry Blood. (13) Apr. 23.

Placing Pile-Foundation Piers for New Building before Demolition of Old.* (13) Apr. 23.

Concrete Fence Posts on the San Pedro, Los Angeles & Salt Lake R. R. (13) Apr. 23.

Critical Loads for Ideal Long Columns.* Arthur Morley. (11) Apr. 24.

Constructing Deep New Foundations in Old Building.* (14) Apr. 25.

Structural Features of Hotel Vancouver.* (14) Apr. 25.

Anchor-Bolt Tension: Six Different Results from Six Books.* R. Fleming. (13) Apr. 30.

The Cement Gun and Gunite.* (45) May.

Girderless Reinforced Concrete Slabs, Proposed City Ordinance to Regulate the Design and Construction of Buildings of this Type and Discussion of Chicago Conditions. Ernest McCullough, M. Am. Soc. C. E. (14) May 2.

Pneumatic Rammers for Concrete.* Charles A. Hirschberg. (14) May 2.

Le Fer et le Béton Armé en 1913 et l'Exposition de la Construction de Leipzig.* Alexandre Gouvy. (32) Jan.

Méthodes Modernes de Recherche de la Constitution du Ciment.* (84) Serial beginning Mar.

Calcul des Pièces Fléchies et Comprimées en Ciment Armé.* Moreau. (35) Apr.

Structural—(Continued).

Die Berechnung der frei aufliegenden, rechteckigen Platten.* Heinrich Leitz. (79) Vol. 23.

Neuere Rahmen- und Krag-Bauten in Eisenbeton.* Wihi. Becker. (51) Sup. No. 24, 1913.

Die Berechnung von Pfahlrost-Gründungen.* Max Buchwald. (51) Sup. No. 24, 1913.

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